Wisconsin Chemical Release Toolkit

Wisconsin
Department of Health Services

Division of Public Health
Bureau of Environmental and Occupational Health

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Introduction

Purpose

The purpose of this chemical release 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 in Appendix B.

Background

Based on data gathered by the National Toxic Substance Incidents Program (NTSIP), there were 835 chemical spill events in Wisconsin from 2010 to 2012. Of these events, 107 releases caused evacuations, and 57 resulted in injuries or fatalities. The most commonly spilled or released chemicals were ammonia, natural gas, and hydrochloric acid, but chlorine releases caused the greatest number of injuries. According to the Agency for Toxic Substances and Disease Registry, 2,474 people were harmed by chemical spills in the United States from 2010 to 2012.[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.

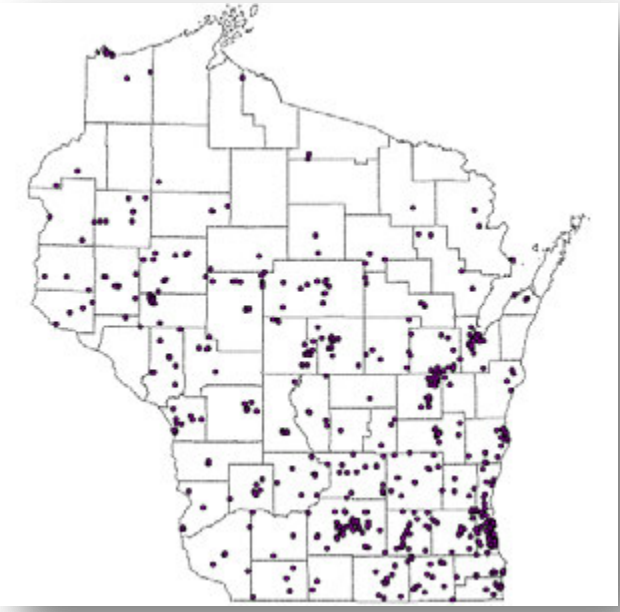


Figure 1: Wisconsin chemical releases from 2010-2012

Climate Trends

According to the National Climatic Data Center, the United States broke 3,527 monthly weather records for snow, rain, and heat in 2012.[2] That same year, 23 Wisconsin counties experienced record-breaking amounts of precipitation.[3] Wisconsin Initiative on Climate Change Impacts (WICCI) climate scientists expect that Wisconsin precipitation will continue to increase into the mid-century (see Figure 2). According to WICCI scientists, changing climate patterns will place stress on the built environment: "It will increase stress on concrete, which affects roads, bridges and buildings, and it will increase stress on asphalt roads because of the changes in the freeze-thaw cycle."[4] From 2010 to 2012, approximately ten percent of all chemical spill events in Wisconsin were documented to be associated with rain, ice, sleet, and snow. 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.

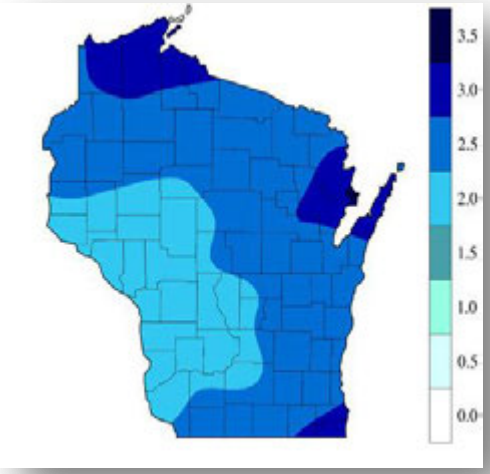


Figure 2: Anticipated change in the frequency of 2'' precipitation events (days per decade) from 1980 to 2055 (WICCI)

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 (e.g., 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.

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.

Image source: Calvin College, Grand Rapids, Michigan[17]

Definitions[5,6]

Biotoxins - Poisons that come from biological sources (e.g., nicotine).

Blister agents/vesicants – Chemicals that severely blister the eyes, respiratory tract, and skin on contact (e.g., mustard gas).

Blood Agents - Chemicals that affect the body by being absorbed into the blood (e.g., carbon monoxide).

Caustics – Chemicals that burn people's skin, eyes, and mucous membranes on contact (e.g., 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 (e.g., ammonia).

Hazardous Substance - Any chemical agent released into the 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 (e.g., opioids).

Long-acting Anticoagulants – Chemicals that prevent the proper coagulation of blood, which can lead to uncontrollable bleeding (e.g., super warfarin).

Metals – Agents that consist of metallic poisons (e.g., mercury).

Nerve Agents – Chemicals that prevent the nervous system from working properly (e.g., sarin).

Organic Solvents – Agents that damage tissues by dissolving fats and oils (e.g., benzene).

Vomiting Agents – Chemicals that cause nausea and vomiting (e.g., adamsite).

Guide 1: 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**

Northeast: Beth Erdman **(920) 303-5410**

Northern: John Sager **(715) 365-8959**

West Central: Tom Kendzierski **(715) 839-1604**

South Central: Mike Schmoller **(608) 275-3303**

Southeast: Scott Ferguson **(414) 263-8685**

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: **(608) 258-0099**

Guide 2: Sheltering in Place[7]

"Sheltering in place" is an emergency response practice in which your current, indoor location becomes your shelter.

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.

When a "shelter in place" order has been announced, go inside immediately and take the following steps to ensure your safety.

Image sources: www.mfb.vic.gov.au and Cerro Gordo County

- Shut and lock all windows and doors.
- Turn off the furnace, air conditioner, and fans.
- Close fire damper and any other openings.
- Pick the highest room inside the building with as few windows and doors as possible. This room will preferably have a water supply.
- 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
        - 1 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.
- Turn on the radio and listen for updates.
- Place plastic over any windows and doors and seal with duct tape.
- Tape over any vents, outlets, or other openings.
- Do not go outside until local officials advise you it is safe.

Guide 3: Evacuation Due to a Chemical Release[8]

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

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.

1 gallon of water per person per day

3 day supply of non-perishable food

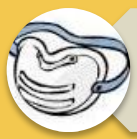
Battery operated radio and extra batteries

Cell phone and charger

Flashlight

First Aid Kit

Whistle to signal for help



Dust mask

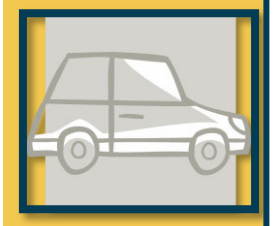
Wrench to turn off utilites

Medications, moist towelettes, plastic ties, and garbage bags for personal use.

Local maps for evacuation

Image source: Polk County, Iowa

Guide 4: What to Do If You Are Outside During a Chemical Release[9]



In a vehicle

Find the nearest building and go inside. Cover your mouth with a cloth while traveling from your car to the building.

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." (Ready.gov)

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[10]

Quickly remove clothing that has come into direct contact with a chemical. Cut off clothing rather than pulling it over your head.

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.

Alert local officials of your "contamination bag" for proper disposal.

Guide 5: Ammonia[11]

Ammonia is the most common chemical spilled in Wisconsin. Recently, an ammonia release was responsible for the evacuation of 1,500 people, the largest evacuation due to a chemical release from 2010 to 2012. Ammonia is water soluble. At low concentrations, it is an irritant. At high concentrations, it can be deadly.

FACTS

Colorless, odorous gas

Also known as "anhydrous ammonia"

Man-made and naturally occurring

NH_3

Image source: CDC

EXPOSURE

Ammonia can be found in:

- Fertilizer
- Industrial refrigerant
- Household and industrial cleaners
- Decaying manure

Exposure can result from:

- Inhaling in ammonia from transportation or storage leaks
- Over-exposure to fertilizer
- Cleaning solution ingestion, inhalation, or contact

HEALTH EFFECTS

Eye Contact: Ammonia can cause eye irritation and burns. If possible, take out contacts. Rinse eyes with water for 15 minutes.

Skin Contact: Ammonia can cause skin irritation and burns. Flush exposed area with water.

Inhalation: Breathing in ammonia can cause irritation, burns, swelling, and constriction of airways. Remove yourself or victim from the area of contamination to breathe fresh air.

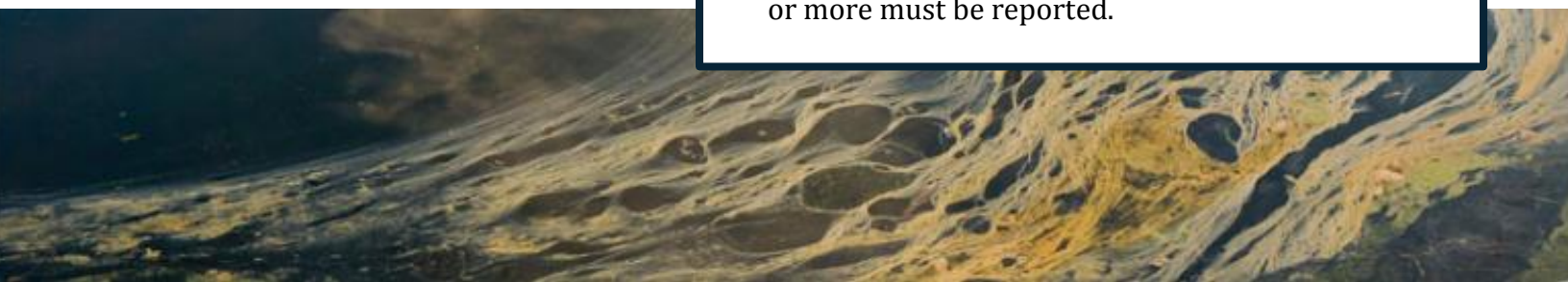
Ingestion: Ingestion of ammonia, though rare, may cause burning and irritation of the mouth, throat, and stomach.

Other symptoms: Headache, nausea, vomiting.

Chronic Exposure: Repeated exposure to ammonia has been shown to result in asthma-like symptoms and lung damage.

Regulations:

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



Guide 6: Natural Gas[12]

From 2010 to 2012, natural gas was the second most common chemical released in Wisconsin. Natural gas releases caused the most evacuations of any chemical during this time period.

FACTS

Colorless, nontoxic gas

Rotten egg odorant is added to natural gas before distribution by gas companies for easier detection of leaks.

Call the "Digger's hotline" at 8-1-1 before renovating or digging to prevent punctured pipelines.

Image source: Public Service Commission of Wisconsin

EXPOSURE

Natural gas is used as an energy source for heating, cooking, and electricity generation.

Natural gas 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 over-pressure in the pipeline
- Heavy loading over buried sites

HEALTH EFFECTS

Although natural gas is nontoxic, it poses a risk to human health:

- **Fire**
- **Explosion**
- **Suffocation** – Natural gas replaces oxygen in the air, and can therefore 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
  - Headaches
  - Dizziness
  - Confusion
  - Unconsciousness

Guide 7: Hydrochloric Acid[13]

Hydrochloric acid is the third most common chemical spilled in Wisconsin.

FACTS

Odorous, acidic solution

Also known as aqueous hydrogen chloride and muriatic acid

Nonflammable

EXPOSURE

Hydrochloric acid is used in:

- The production of chlorides, fertilizers, and dyes
- Photographic, textile and rubber industries
- Laboratories 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

Dermal Contact: When hydrochloric acid (HCl) touches your skin or eyes, it will cause irritation and burning due to its acidic properties. Wash skin and eyes with water for 15 minutes after exposure.

Ingestion: Swallowing HCl will cause the following:

- Burns and scarring along digestive tract, including mouth, esophagus, and stomach
- Nausea
- Vomiting
- Diarrhea

If a person ingests HCl, give water or milk to dilute the HCl.

Inhalation: At room temperature, HCl is a gas, called hydrogen chloride. If inhaled, HCl causes coughing, choking, and burning of the throat.

HCl

Image source: www.emedco.com

Regulations:

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

Guide 8: Chlorine[14, 15]

Chlorine accounts for the majority of chemical spill-related injuries and hospitalizations in Wisconsin, with a total of 52 victims from 2010-2012.

FACTS

Greenish-yellow gas at room temperature

Odorous

Because chlorine is heavier than air, it will occupy poorly ventilated areas that are low-lying.

EXPOSURE

Chlorine is used in:

- Disinfectants
- Water purification
- Bleach
- Treatment of sewage

Exposure can result from:

- Industrial or transportation leak
- Mixing certain household chemicals* with bleach, which can create chlorine gas
- Improper chlorination of swimming pools
- Occupational exposure

HEALTH EFFECTS

Eye Exposure: Symptoms include burns, excessive blinking, involuntary closing, redness, and inflammation.

Skin Exposure: Symptoms include burns, pain, inflammation, and blisters.

- Liquid chlorine can cause frostbite or chemical burns on the skin.

Inhalation: The most common mode of chlorine exposure. Symptoms include, "rapid, difficult breathing, bluish skin color, wheezing and congestion, cough, nausea and dizziness, burning, irritated throat, swelling or narrowing of the airways, chlorine induced pneumonia, [and] possible lung collapse."[15]

Cl_2

Image source: www.emedco.com

* Mixing bleach with household cleaners that contain acid or ammonia creates hazardous fumes. Read the product label to ensure chemical safety.

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

Guide 9: Talking Points for Chemical Releases

If you are approached by the media regarding a reported chemical release in your jurisdiction, the following talking points may be used.

1. We were notified by the Medical Examiner/Coroner about a fatality possibly due to a chemical release. Our condolences go out to the family.

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

or

3. On *[insert date],* a *[gender] ["____ years old" or "between the ages of ___ and ___"]* was injured or died during the current chemical release.

or

4. We have *not* been notified of any recent fatalities or injuries linked to the chemical release.

Any of the above can be followed up by these points:

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

    a. Reporting chemical spills to local officials.
    b. Listening to local officials for orders to shelter in place or evacuate.
    c. Avoiding contamination zones and remaining upwind of any spills.

For more information, visit *[insert relevant website].*

Guide 10: Message Maps about Chemical Release Safety

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 and easy-to-understand fashion.

General guidelines to follow when creating a message map include:

- Stick to three key messages or one key message with three parts for each underlying concern or specific question.
- Keep key messages brief. The reader should ideally spend less than 10 seconds per line.
- Develop messages that are easily understood by the target audience. (For communications with the general public, use a 6th to 8th grade readability level.)
- 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. Try to balance negative messages with positive ones.
- Avoid unnecessary uses of the words no, not, never, nothing, and none.[16]

The following is a message map that could be used when addressing the general public about chemical release safety.

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

Key Messages (3 key messages)	Supporting Information (3 items of supporting information for each key message)
Message 1: *Shelter in place when ordered.*	**Supporting Information 1** *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.* **Supporting Information 2** *Prevent chemicals from entering your shelter-in-place location by sealing all vents, doors, and windows with plastic and tape.* **Supporting Information 3** *Watch the TV and listen to the radio for updates. Do not leave your location until authorities give the "okay."*
Message 2: *Evacuate when ordered.*	**Supporting Information 1** *If authorities order an evacuation, move quickly and follow recommended routes out of your community.* **Supporting Information 2** *Have an emergency disaster kit in your home and car to ensure a speedy evacuation.* **Supporting Information 3** *Form and practice an evacuation plan with your family.*
Message 3: *Report chemical releases.*	**Supporting Information 1** *If a chemical is released on your property or at work, call the Wisconsin Department of Natural Resources for assistance.* **Supporting Information 2** *Call a medical professional if you come in contact with an unknown or hazardous chemical.* **Supporting Information 3** *Contain the release, if possible.*

Appendix A: References

1. Agency for Toxic Substances and Disease Registry. National Toxic Substance Incidents Program (NTSIP). National Estimated Incidents. https://hip.phmsa.dot.gov/analyticsSOAP/saw.dll?Dashboard

2. National Oceanic and Atmospheric Administration (NOAA), National Climatic Data Center (NCDC) U.S. Records 2012 website at: http://www.ncdc.noaa.gov/extremes/records/monthly/maxt/2012/01/00?sts%5b%5d=US#records_look_up

3. National Resources Defense Council. Extreme Weather Map 2012. http://www.nrdc.org/health/extremeweather/

4. Wisconsin's Changing Climate: Impacts and Adaptation. 2011. Wisconsin Initiative on Climate Change Impacts. Nelson Institute for Environmental Studies. UW-Madison and Wisconsin Department of Natural Resources, Madison, WI. http://www.wicci.wisc.edu/report/WICCI-Chapter-7.pdf

5. United States Department of Labor. Occupational Safety and Health Administration. Chemical Hazards and Toxic Substances. https://www.osha.gov/SLTC/hazardoustoxicsubstances/

6. Center for Disease Control and Prevention. Emergency Preparedness and Response. Chemical Emergencies Overview. http://emergency.cdc.gov/chemical/overview.asp

7. Center for Disease Control and Prevention. Emergency Preparedness and Response. Chemical Agents: Facts About Sheltering in Place. http://www.bt.cdc.gov/planning/shelteringfacts.asp

8. Ready.gov. Evacuating Yourself and Your Family. http://www.ready.gov/evacuating-yourself-and-your-family

9. Ready.gov. Hazardous Materials Incidents. http://www.ready.gov/hazardous-materials-incidents

10. Center for Disease Control and Prevention. Emergency Preparedness and Response. Chemical Agents: Facts About Personal Cleaning and Disposal of Contaminated Clothing. http://emergency.cdc.gov/planning/personalcleaningfacts.asp?mobile=false

11. North Carolina Department of Health and Human Services. Hazardous Substances Emergency Events Surveillance Program: Ammonia. http://epi.publichealth.nc.gov/oii/ammonia/ammonia.pdf

12. Public Utilities Commission of Ohio. Natural Gas Safety. http://www.puco.ohio.gov/puco/index.cfm/consumer-information/consumer-topics/natural-gas-safety/

13. United States Environmental Protection Agency. Hydrochloric Acid (Hydrogen Chloride). http://www.epa.gov/ttn/atw/hlthef/hydrochl.html

14. North Carolina Department of Health and Human Services. Hazardous Substances Emergency Events Surveillance Program. Chlorine Facts. http://epi.publichealth.nc.gov/oii/chlorine/chlorine.pdf)

15. Center for Disease Control and Prevention. Emergency Response Safety and Health Database. Chlorine: Lung Damaging Agent. http://www.cdc.gov/niosh/ershdb/EmergencyResponseCard_29750024.html

16. Covello VT. Message mapping. Accessed March 7, 2014, at: http://www.orau.gov/cdcynergy/erc/content/activeinformation/resources/Covello_message_mapping.pdf

17. Calvin College. EH&S: Spill Response. Accessed May 19, 2014, at: http://www.calvin.edu/admin/physicalplant/departments/ehs/policies/spill-response/spill-response.html

18. National Oceanic and Atmospheric Administration (NOAA), Office of Response and Restoration. Accessed May 19, 2014, at: http://response.restoration.noaa.gov/oil-and-chemical-spills/oil-spills

Appendix B: Additional Resources

Wisconsin Department of Health Services (DHS): Chemical Hazards A-Z Fact Sheets
http://www.dhs.wisconsin.gov/eh/chemFS/index.htm

Wisconsin Emergency Management, "Ready Wisconsin": Technological Threats – Hazardous Materials.
http://readywisconsin.wi.gov/Informed/Informed.asp?maintab=0

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

FEMA Spanish Language Portal
http://www.fema.gov/es/

Federal Centers for Disease Control and Prevention (CDC): Chemical Emergencies
http://emergency.cdc.gov/chemical/

Federal Environmental Protection Agency (EPA): Emergency Response
http://www2.epa.gov/emergency-response

Agency for Toxic Substances and Disease Registry
http://www.atsdr.cdc.gov/

List of Wisconsin Local Public Health Departments
http://www.dhs.wisconsin.gov/localhealth/

List of Wisconsin Tribal Health Directors
http://www.dhs.wisconsin.gov/localhealth/

American Association of Poison Control Centers
http://www.aapcc.org/