

Chlorine Facts in Mississippi

This fact sheet provides information on chlorine and summarizes data collected by the Mississippi State Department of Health's (MSDH) Hazardous Substances Emergency Events Surveillance (HSEES) system as part of a federal program studying accidental releases of hazardous materials. The program's goal is to reduce injury and death from chemical incidents. A clear understanding of how and why chlorine releases occur and how to avoid them can facilitate better training and improve the safety of workers, responders, and the public.

Chlorine is used as a bleaching agent, to treat sewage effluent, for water purification, and as a disinfectant. At room temperature, it is a yellow-green gas with a sharp, burning odor. It becomes a clear, reddish colored liquid under increased pressure or at temperatures below -30 degrees F. Chlorine presents a potential for a catastrophic event at or above the threshold quantity of 1,500 pounds according to the List of Highly Hazardous Chemicals, Toxics and Reactives in OSHA's Respiratory Protection Standard, 29 Code of Federal Regulations (CFR) 1926.64, Appendix A.

Exposure to chlorine can cause immediate burning of the eyes, nose, and throat, warning of potentially hazardous exposure levels. Short-term exposures to chlorine do not often result in long-term health effects. Long-term effects are usually found in people who have had repeated exposures to chlorine causing them to build a tolerance to its irritant effects, making victims unaware of the chemical's presence. Repeated chlorine exposure irritates the lungs, leading to coughing, mucus production, or shortness of breath which can last for months, even years. The very young and elderly, as well as people with known health problems are at increased risk from chlorine exposure.

Common Routes of Chlorine Exposure

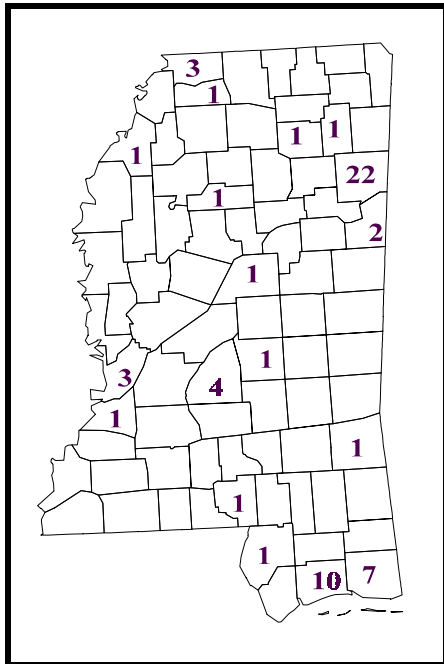
Inhalation. The most common way for chlorine to enter the body is through the respiratory system. Signs and symptoms of chlorine inhalation can include: rapid, difficult breathing; bluish skin color; wheezing and congestion; cough; nausea and dizziness; burning, irritated throat; swelling or narrowing of the airways; chlorine-induced pneumonia; and possible lung collapse.

Absorption through the Skin. Chlorine can be absorbed through the skin causing mild to severe burns. Symptoms include: pain, inflammation or swelling, blisters, frostbite, and tissue death.

Absorption through the Eyes. Chlorine can be absorbed through the eyes causing various problems. Symptoms may include: burning or discomfort, irregular blinking, redness, tearing, involuntary closing of the eyelids, eye burns, eye pain, and blurred vision.

Ingestion. Chlorine may cause tissue injury upon swallowing.

From 1995 - 2000, there were 62 chlorine releases in 18 of Mississippi's 82 counties (Map 1). Over half of all releases occurred in two counties (Monroe and Harrison). Of the 62 events, seven (11.3%) involved more than one chemical; however, chlorine was the primary chemical involved in these releases.



Map 1: Locations of Chlorine Releases, 1995 - 2000

Fifty-seven (91.9%) events occurred in fixed facilities and the remaining five (8.1%) occurred during transport. Of the 57 chlorine releases occurring in fixed facilities, 53 (92.9%) occurred in above-ground storage tanks, process vessels, piping, incinerators, material handling areas, and ancillary process equipment. Three releases occurred in other areas of the fixed facility and one was unknown. While most of these releases were unintentional, they resulted in numerous injuries and 15 workplace evacuations.

Counties with Four or More Chlorine Releases, 1995-2000	
County	No. of Releases
Rankin	4
Jackson	7
Harrison	10
Monroe	22

General Information	
Number of chlorine releases	62
Number of events involving victims	11
Number of victims Responders (0), Employees (15), and General Public (14)	29
Number of events due to equipment failure	41
Range of amounts released: 10 - 11,500 pounds	

Type of Chlorine Release	
Air release only	58
Spill and air release	1
Threatened release	3
Total Releases	62

Types of Injuries	
Respiratory	22
Shortness of breath	8
Eye irritation	6
Gastrointestinal (1), Dizziness (1), Headache (1), and Chemical Burns (1)	4
Total injuries (NOTE: The number of injuries can exceed the number of victims because victims may experience more than one injury.)	40

Events with Decontamination at Scene or Medical Facility	
# of events with responders decontaminated	3
# of events with employees decontaminated	1
# of events with members of the general public decontaminated	1
Total Events with Decontamination	5

Type of Response Plan	
Ad hoc (no pre-existing plan followed)	4
SARA Title III incident command system	1
Company's operating procedures	17
HAZMAT/response team's SOP	16
Other	3
Unknown (respondent did not know)	13
Total Plans (NOTE: Eight events recorded that no response plan was in place.)	54

Proper Handling and Storage Procedures

Chlorine should be stored in a cool, dry, well-ventilated area in tightly sealed containers protected from exposure to weather, extreme temperature changes, and physical damage. Chlorine should be stored separately from flammable gases, vapors, and combustible substances such as gasoline, petroleum products, alcohol-based products, ammonia, sulfur, hydrocarbons, and acetylene. Although chlorine is not combustible, it is a strong oxidizer, and contact with these substances may lead to a fire or explosion. Ignition sources usually include smoking or open flames.

If a fire occurs near chlorine cylinders, remove them promptly and safely. If removal is not possible, cool non-leaking cylinders by spraying with water. Under no circumstances should water be used if the cylinders are leaking because chlorine reacts violently with water. Never use chemical or carbon dioxide (CO₂) extinguishers if chlorine is involved in a fire.

Personal Protective Equipment (PPE)

Clothing. Avoid skin contact with chlorine. Wear protective gloves and chemical resistant clothing. Keep clothing clean and free of oils and grease.

Eye Protection. Wear splash-proof chemical goggles and a face shield when working with liquid chlorine, unless full face-piece respiratory protection is worn. When there is or may be chlorine gas exposure, gas-proof goggles with face shields should be worn.

Respiratory Protection (respirators). Should be NIOSH (National Institute for Occupational Safety and Health) approved specifically for chlorine and used in accordance with the OSHA Respiratory Protection Standard, 29 CFR 1910.134. Under routine exposures where the ambient concentration of chlorine exceeds 0.5 ppm, an air purifying, full-face respirator equipped with chemical cartridges appropriate for chlorine should be used. For unknown concentrations of chlorine (as in uncontrolled releases) only a pressure-demand SCBA (self-contained breathing apparatus) is appropriate. Respirator use must be limited to individuals who have been adequately trained and fitted for the respirator face-piece. Companies may refer to 29 CFR 1910.119, the Process Safety Management of Highly Hazardous Chemicals Standard for further information.

What to Do in Case of an Emergency Chlorine Release –

- Notify trained personnel immediately, such as the company HAZMAT team or the local fire department. Untrained persons or those without proper personal protective equipment must not enter areas with high concentrations of chlorine.
- Evacuate people from the hazardous area for at least 50 feet in all directions and have them stay upwind of the chlorine release. They should be sheltered in a building with doors and windows shut and air conditioners turned off.
- Stop/control the source of exposure. If the exposure is from a leaking cylinder, take it outdoors or to an open area until completely drained and contents have evaporated.
- Ventilate potentially explosive atmospheres by opening windows.
- Keep combustibles such as wood, paper, and oil, away from the leak.
- Remove all sources of heat and ignition.
- Refer to the manufacturer's Material Safety Data Sheet (MSDS) for more information.

What to Do When a Person is Exposed to Chlorine –

- Remove the exposed person(s) to fresh air.
- Call 911 immediately and notify company safety personnel.
- If the victim is not breathing, begin artificial respiration. If the victim is breathing, place in a seated position or lying down with the head and upper body in an upright position. Encourage slow, deep, regular breaths. Have a health professional administer oxygen.
- Keep the person warm and quiet.
- Persons with serious symptoms may need to be hospitalized.

Decontamination Procedures –

- Remove soaked clothing from the victim and double-bag it immediately.
- Flush exposed skin/hair with water for 2-3 minutes; wash twice with mild soap and rinse thoroughly with water.
- Flush exposed or irritated eyes with water/saline for 15-30 minutes. If the person is wearing contact lenses, try to remove them.

If you are contacted by HSEES about a hazardous chemical spill, please answer questions as accurately as possible. The information you provide is critical in preventing future spills, and in reducing the risk of injury to employees, responders, and the public.

**For more information,
contact the Hazardous Substances
Emergency Events Surveillance
program at 601-576-7725.**



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