Chlorine Gas Safety

By: Jenny Porrevecchio, Senior Loss Control Consultant at IRMA
May 2021

Did you know that chlorine gas was once used as chemical warfare in WWI? If your municipality handles water treatment and/or wastewater, it is likely that same chemical is onsite right this very minute. Are you confident that proper safety procedures in place? While chlorine delivery systems, equipment, and operations are site-specific, a number of procedures and design specifications for chlorine rooms are considered minimum acceptable practice.*

The following list lays the groundwork for safe chlorine storage and handling. Affected departments are also encouraged to review the Chlorine Institute's Pamphlet 155 – Water and Wastewater Operators Chlorine Handbook for more information:

Identify the Hazards of Chlorine Gas:

- To adequately protect employees from exposure to chlorine gas, an assessment of risk must be completed. The assessment should include evaluation of indoor air quality, proper ventilation, leaks, or accidental releases. If you have not already done so, contract with an industrial hygienist to evaluate air quality, assess the need for ventilation, respirators, and other protective equipment, and establish operating procedures for safe entry. See the IRMA website for a recommended vendor and IRMA's Facility Equipment & Safety Grant to help with any costs associated with these services.
- Refer to the chemical's Safety Data Sheet (SDS) for hazards, required PPE, emergency response, proper storage, and handling. Incorporate this information into your Hazard Communication Program.
- Discuss hazard potential and control with your chemical supplier and the equipment manufacturer.
- See page 65 of the ILEPA General Guidance on Risk Management Programs for Chemical Accident Prevention for a sample checklist for hazard identification.

Implement Hazard Controls:

- **Chemical monitoring -** Have continuous monitoring available to detect leaks. Also, see this OH&S article for more information on types of monitoring systems. IRMA's Facility Equipment & Safety Grant can also help with costs of facility improvements.
- **PPE -** PPE should be selected for both routine work and accidental leaks or spills. The chemical's SDS will dictate what PPE is required. This may include full-face respirators and escape-type respirators for routine maintenance and a self-contained breathing apparatus (SCBA) for suspected leaks and rescue in an emergency scenario. Respirators must be rated for the type of chemical exposure and fit tested for and issued to each employee. Medical evaluations must also be conducted for all employees required to wear respirators. See IRMA's Respiratory Protection Model Policy for more information on implementing respirators in the workplace.

- **Room design** – At minimum, the chlorine storage room should have:
    - Inspection window
    - Ventilating fan
    - Air intake near the ceiling
    - Exhaust fan near the floor (exhausts outdoors)
    - Individual, vandal-proof switches for fan and lights located outside the room and at inspection window
    - Non-slip floors
    - No floor drains
    - Leak detection equipment with alarm
    - Leak repair kit
    - NFPA labeling outside the room
    - Storage equipment, such as chains or cabinets, to prevent accidental tip-over of chlorine tanks
    - Fire extinguisher suitable for chlorine gas, located near the exit
    - See page 28 of Pamphlet 155 or these resources for more information on chlorine room design:
      Washington State Department of Health - How to Handle Chlorine Gas Safely
      Illinois General Assembly Standard for Chlorine Disinfection for Sewage Works
      Preventing Chlorine Gas Accidents Article
      NIOSH Chlorine Emergency Response Card
      Compressed Gas Cylinder Safety

- **Chlorine room entry procedures –** Written procedures should be established for all routine tasks and emergency response. Procedures should be outlined in department JSAs and include necessary PPE, pre-task checklists, minimum number of employees required and other considerations.

- **Emergency response –** Develop emergency response plans for potential leaks or other emergency scenarios. See page 35 of Pamphlet 155 for more information on how to develop and what to include.

Train Affected Employees:

- All employees, including maintenance and contractors, involved with highly hazardous chemicals need to fully understand the safety and health hazards of the chemicals and processes they work with for the protection of themselves, their fellow employees, and nearby residents.

- Training must be conducted in compliance with 1910.1200, the Hazard Communication Standard, to educate employees about the chemicals they work with as well as how to read and understand chemical SDSs.

- Additional training in subjects such as operating procedures and safe work practices, emergency evacuation and response, and routine and nonroutine work activities will need to be covered by an employer's training program.

- Training should be completed prior to initial assignment, any time a new chemical hazard is introduced to the workplace, and following any workplace accident, near miss, or reason to believe there is a deviation from safe work practices.

Other helpful resources:

- IL Water System Design Code
- CDC Chlorine Facts

**If your facility stores 1500 lbs. or more of chlorine, you are required to comply with OSHA 1910.119, Process Safety Management of Highly Hazardous Chemicals. See the standard for more information.*