

Chlorine Gas Disinfection: Total Containment and RMP Studies

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Plant Managers across the country are faced with complex safety requirements in the operation of a water treatment plant. Heightened US Environmental Protection Agency (USEPA) requirements are expected when chlorine gas is used as a disinfectant because chlorine is designated as an Extremely Hazardous Substance (EHS) as defined in 40 CFR Part 355. Certain emergency planning activities known as Risk Management Studies (RMP) are also required by Federal and many State agencies when chlorine is stored above a certain threshold quantity (TQ). Additionally, the method of storing chlorine will influence the scope and extent of the emergency plan preparation that is required by the RPM regulations. This article discusses the impact of total containment on the preparation of Federal RMP Studies. It is recommended that State and local regulations be reviewed when preparing emergency plan preparations for additional requirements.

The water treatment industry uses two techniques for the control of chlorine leaks. These are scrubbing or containment.

- Scrubbing is a treatment system that neutralizes the accidental release of chlorine gas by drawing contaminated air through a chemical absorption system. The treated air is discharged to the atmosphere.
- Containment systems employ a self-contained vessel within which the chlorine gas cylinder is housed. Accidental leaks of chlorine are kept within the containment vessel, an ASME rated pressure tank, for recycling to the injection system at a normal flow rate. No atmospheric venting is generated because the leaked gas is kept within the containment vessel. TGO Technologies, Inc., of Santa Rosa, California, has developed self-containment vessels for both 150-pound and 1-ton cylinders that perform this function. See photo.

Both scrubbing and containment technologies for chlorine gas are subject to the requirement of an RMP, as stipulated in Section 112 (r) of the Clean Air Act and Article 80 of the Uniform Fire Code. In Section 112 (r), the USEPA developed a list of 77 toxic and 63 flammable substances for which TQs were established. The TQ for chlorine is 2,500 pounds.¹ Facilities storing chlorine gas in quantities that equal, or exceed 2,500 pounds are required by statute to prepare an RMP in accordance with 40 CFR Part 68, Subpart G.

1) From EPA 550-B-15-001, March 2015, List of Lists page 31
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It is important for Plant Managers to accurately inventory the quantities of stored chlorine gas cylinders at the plant site. Stored quantities of less than 2,500 pounds do not trigger the preparation of a Federal RMP, an activity that requires significant administrative time and effort which diverts scarce resources from plant operation and system monitoring.

A further consideration when determining whether a facility must prepare an RMP is the method used to control chlorine leaks. A self-contained, total containment vessel of the type available from TGO Technologies, as described above, is considered a separate process if not manifolded or interconnected to other vessels. That is, a single, unconnected 1-ton cylinder housed in a total containment vessel would be below the exempt TQ of 2,500 pounds and an RMP would not be required. Up to sixteen (16) 150-pound gas cylinders may be interconnected and not meet the TQ of 2,500 pounds (i.e. $150 \times 16 = 2,400$ pounds). However, the manifolding of a seventeenth 150-pound cylinder triggers the requirement for a Federal RMP. It is recommended that treatment facilities review their gas chlorine system storage and delivery designs to determine if these designs can be modified to separate, currently connected 1-ton cylinders, resulting in a stored quantity of 2,000 pounds, a quantity below the threshold 2,500-pound TQ amount, and thereby avoid the preparation of an RMP.

We have been discussing the specific TQ amounts that trigger the preparation of a Federal RMP as presented in Section 112 (r) of the Clean Air Act. The use and storage of gaseous chlorine triggers other safety and reporting requirements as mandated by the Emergency Planning and Community Right to Know Act (EPCRA), the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) and others such as OSHA's Section 1910.119² that must be prepared by the facility. We also note that State RMP TQs may be more stringent than the federal regulation identified in Section 112 (r); for example, California's TQ for chlorine is only 100 pounds. It is strongly recommended that your state's TQ requirements for chlorine be checked when assessing the need to perform an RMP.

In conclusion, the TQ for conducting a Federal RMP Study for chlorine gas is 2,500 pounds. If a water treatment facility has multiple 1-ton chlorine cylinders, and each is enclosed within a total containment vessel designed to withstand any release of chlorine, and if they are not interconnected, each is considered to be a separate process. This will allow the separate vessels, individually, to be below the exempt quantity of 2,500 pounds, and no RMP Study is required.

²) 29 CFR Ch. XVII (7-1-12 Edition). This regulation governs the preparation of a Process Safety Management Program (PSM). The storage of 1,500 lb or more of chlorine triggers a Federal PSM.