

Chlorine Chemical Handling

By far the most common water and waste water treatment chemical disinfectant is Chlorine. As with most components, this chemical can be used in solid, liquid, and gaseous form. Chlorine is hazardous if ingested or inhaled. Serious life threatening conditions can evolve from a Chlorine leak exposure. All chlorine handling should be in compliance with state health services, EPA, and other regulatory entity requirements.

To provide information assistance to our customers, RSDIS Risk Control provides the following guide:

Solid Chlorine

Chlorine disinfection can be found in 'tablet' form. In this solid form, pollution exposure is generally low. This type of treatment is normally found at well sites. Tablet injection systems distribute the tabs.

The protection method is to keep the material dry (away from potential wetting sources) while in storage. Keep the chlorine tab boxes in a designated storage room and kept off the ground. Skids, pallets, or shelving units can achieve this goal.

However in the liquid and gaseous form, Chlorine does provide a greater pollution exposure.

Liquid Chlorine

In liquid form, Sodium Hypochlorite is the most common Chlorine compound used.

At well sites, smaller containers (typically around 15-gallon size) are used. Spill enclosures or other suitable prevention methods should be used. Exposure in these cases is generally low. At larger treatment facilities, liquid chlorine in large (up to 12,000-gallon or more) tanks are commonly used. In these cases every effort to prevent accidental spill conditions should be developed. Exposure in these cases is generally high.

One suitable method is double walling the tanks. In this case, if the main tank ruptures, the outside wall will 'fully' contain the tank contents. These tank arrangements are generally purchased from the tank manufacturer.

Another method is to keep chlorine tanks in a containment dike enclosure. The containment dike can be concrete, steel, or other suitable construction and capable of fully holding the entire contents of the tank. The dike should be equipped with suitable float level controls & alarms.

These operations should be fully monitored through a constantly attended SCADA system.

Chlorine Gas

In gaseous form, Chlorine is 2.5 times heavier than air and very toxic. Therefore, escaped gas accumulates at lower levels allowing for easier human ingestion. Inhalation of Chlorine gas causes throat irritation, coughing, respiratory, and other serious problems. Enough ingestion can be life threatening.

Typically one ton 'portable' tanks are used. However, some districts use larger sized 'fixed in-place' tanks. The one ton tanks are typically owned, maintained, and transported by a supply contractor. Since the contractor is primarily responsible for the chlorine gas tanks while not on district property, overall exposure is limited until at the treatment plant.

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Normally no more than 10 tanks (in-use or in reserve) are allowed at any given time. The tanks should be properly secured and mounted. A suitable and properly maintained crane system is normally in place to safely move the tanks.

At treatment plants protection design begins with a separate room that is cut-off by two-hour fire rated construction and as air tight as possible. The tanks should be monitored by floor sensors (sniffers) situated no higher than 12-inches off the ground. Activation of a floor sensor should activate an exhaust and scrubber system.

The exhaust system should be designed to rapidly exhaust the atmosphere of the room into an external scrubber system. The scrubber system is a caustic neutralization unit. The scrubber will neutralize the gas prior to release into the general atmosphere.

All system alarms should be tied to a constantly attended SCADA system. The protection components should receive maintenance and testing per manufacturers specifications. Suitable maintenance documentation should be kept in file for review.

Emergency Response

The district corporate office should be capable of taking and responding immediately to all emergencies or concerns regarding chlorine and other chemical exposures. An on-call service should be available 24 hours per day, seven days per week to deal with all related emergencies. All complaints and concerns should be documented.

A formalized emergency procedure should be developed to deal with emergency chlorine leak exposures. The plan should be in compliance with state Health Services, EPA, and other regulatory entity requirements for an established emergency notification plan. The notification process includes using newspapers, radio, TV, and other media outlets to pass along important emergency details and procedures to the general public. The exact criteria depends on the nature of the emergency.

Transportation

Chlorine leak exposure during transportation is a real exposure. A leak or tank rupture, however small, can be problematic. Vehicles travel through cities and towns and an exposure can exist. In these cases, the regulations for chemical handling and transportation set out by the US Department of Transportation (DOT) should be followed. Suitable training or licensing should be conducted for all district drivers handling Chlorine material.

Often the responsibility for transportation of chlorine is done by the supplying contractor. In these cases, the district should make sure the contractor is licensed to handle hazardous chemicals. There should be verification from the contractor that DOT regulations are followed and handlers are trained in these specifications. The contractor should also be insured and have the district named as 'an additional named insured' on their insurance policy. The transporting contractor should (as a minimum) maintain a \$5 million limit on liability.