

Containment systems help ensure chlorine capture

No plant manager ever wants to hear these words: "We have a major chlorine gas leak on one of our ton cylinders."

If you were to be faced by such a situation, what would your response be? What can you do? Chlorine gas creates a low-lying cloud that spreads out from the plant. You think back to what options you had and what you could have done to prevent or contain this leak.

Let's hope you never get to this point. There are just two options to contain a chlorine gas leak. One of these requires a

backup power supply and/or a larger building to house it with some costly engineering.

Plant managers are today faced with the dilemma as to how to comply with the environmental health and safety regulations without

switching to a less reliable disinfection agent that is more costly. At the top of these regulations are EPA's Risk Management Program (RMP) and Article 80 of the Uniform Fire Code.

The most common option in use today is a gas scrubber system.

Gas scrubber system

The emergency chlorine gas scrubber system is a treatment system utilized to handle the accidental release of chlorine gas. The system should be

capable of neutralizing and absorbing the entire contents of a one ton chlorine cylinder and should be designed to reduce the allowable discharge concentration of chlorine to one-half the IDLH value at the point of discharge to the atmosphere.

The scrubber is a single-pass, once-through, three-stage system that uses a sodium hydroxide (caustic soda) solution normally of not more than 20% concentration as the scrubbing liquid.

A chlorine gas leak detector is located on the wall of the gas storage room that will signal the

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presence of a chlorine leak and will initiate scrubber operation. The scrubber system will draw contaminated air from the gas storage room, effectively scrubbing out the gas, and discharging the treated air into the atmosphere.

The gas or vapor scrubber system normally consists of a three-stage chemical absorption system. The system is a self-contained unit that will include the scrubber section, scrubbing solution storage tank,



Mike Dommick, Leavenworth Water Department, moves a one-ton chlorine cylinder into place to be loaded into the utility's new ChlorTainer containment systems.

recirculation pump, exhaust fan, electrical control panel and instrumentation. There will be a spray system followed by two or more bed sections. Most will

have an induced draft fan that will pull vapors through the scrubber, where intimate contact with a recirculating caustic solution results in the complete absorption and removal of chlorine or sulfur dioxide vapors. A negative pressure will need to be maintained at all times in the gas storage room while the scrubber is in operation.

The unit itself will normally be located outside, but attached to, the chlorine storage building.

Gary Armentrout
Tech Assistant



Another system is the Self Contained or Total Containment System. A company by the name of TGO Technologies has developed a totally self-contained containment system that not only protects your employees but the environment as well. Where major engineering and construction are required to install a scrubber system, this is not needed, but it is recommended, to install a total containment system. The cost of a system of this type is close to half the cost of a scrubber system and will take half of the time to install with far less operational training and maintenance.

The ChlorTainer, as it is called, is a self-contained system that requires no pumps, scrubbers, fans, or caustic circulation equipment and because of this, very little maintenance. It is defined as passive for purposes of the RMP and meets with Article 80 of the Uniform Fire Code.

Containment vs. scrubber

Installing the containment vessel is a fairly simple job and requires very little space when compared to a scrubber system. Such a unit can be installed inside a ventilated room or outside with some type of overhead protection and comes equipped with either a permanently placed fixed cylinder loader (as in the picture), or a movable port-a-loader. There are multiple door designs available, which can be operated manually, electronically, or pneumatically. The system can be connected to several different safety devices such as SCADA, chlorine detection, or even seismic detection. It features a high-pressure containment vessel into which a 150-pound or a one-ton chlorine gas cylinder is rolled. When the cylinder is loaded, the vessel is sealed. Through a

vacuum regulator connected to a fail-safe actuator, chlorine is processed from within the vessel. At any time should the cylinder leak, the chlorine gas is contained within the vessel and processed at a normal flow rate. No hazardous waste is ever generated because all of the gas is used. Each vessel is built to withstand the maximum anticipated release pressure of a failed chlorine gas cylinder and is designed for 20 years of service before requiring any repair. The system comes complete with a scale system with 12-inch weight indicator dial, rollers, reseating pressure relief valve, a nitrogen gas operated fail-safe valve, pressure vacuum gauge, cylinder loading system, rails and rollers.

The system does not require backup emergency power to contain a gas release. Elimination of the caustic scrubbing avoids a hazardous waste generation classification and it removes the dangers that are associated with hazardous waste handling.

The Leavenworth Water Department was the first water system in Kansas to install this system. Don Murphy, manager of the



The photo above shows Leavenworth Water Department Operator Mike Domnick tightening bolts on the door of the containment vessel. Mike's comment is that this is the hardest part of the operation, by which he means the entire process is relatively easy.

Leavenworth Water Department, said that some of the main reasons for going to the ChlorTainer system were the lower cost and ease of installation. Don said the cost was close to half of the cost of a scrubber system when you add in the needed maintenance and training of personnel such systems require. The water department installed two sets of the one-ton containment systems, one set in each of the department's water plants.

If you are looking at upgrading your water/wastewater plant or building a new plant, you may want to look into this type of chlorine containment system.

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