Chlorine Containment News™

Vol. 4, No. 2a | *Reported independently by Catalytic Reporting, LLC** | November, 2022

Innovation in Chlorine Containment Eases Operator Buy-In for Secondary Containment Vessels as Reliable Leak Safety Alternative to Scrubber Systems

Secondary containment vessels for chlorine gas cylinders were installed as a reliable, lower-maintenance, enhanced leak safety alternative to wet and dry scrubber systems. The utility's consulting engineering firm had noted "significant savings in maintenance and insurance costs" by being able to "decommission a scrubber system and its associated appurtenances (at end of its useful life)," and not replacing it with a new scrubber.

As an added assurance toward ease of use by plant operators, the utility's consulting engineers collaborated with the containment vessel manufacturer on an optional innovation of adding an electronically con-trolled sled, with a push-bar, to move the cylinders during changeout, instead of having operators physically pushing them. Operators had become disillusioned with previous installation placed in a room that was too small.

In a group interview, engineering and operations management in drinking water operations for the City of Houston, TX report that plant operators have been "buying in better" on use of secondary containment vessels for chlorine gas cylinders, as a reliable, lower-maintenance, enhanced leak safety alternative to wet and dry scrubber systems. In particular, they credit enhanced storage building design, and secondary containment system innovation, as helping considerably in the improved operator buy-in.

Previously, in a published article, their consulting engineering firm had noted "significant savings in maintenance and insurance costs" by being able to "decommission a scrubber system and its associated appurtenances." In any event, operators also noted a new benefit of capturing leaked chlorine for re-injection, rather than "losing it" through scrubbers.

In the online interview, the utility's engineering and operations management, and operations and maintenance staff, discussed their use of the ChlorTainer™ secondary containment vessels for chlorine gas cylinders, beginning in 2018, and continuing to the present. A more recent installation, in 2020, features placement in a new chlorine storage building rather than in already existing structures, as well as featuring a new, more automated loading of cylinders into the vessels. The published article on the topic, co-authored by engineers from the water utility and their consulting firm, was in the Spring, 2021 issue of Participant, which is the magazine published by the Texas Chapter of the American Public Works Association.

In both the group interview and the article, officials recalled how the initial 2018 trial of the secondary containment product was dogged by not enough room in the chlorine storage buildings they were retrofitted into, for operators to easily navigate routine changing of chlorine gas cylinders. That problem was stated as related to leak containment previously being handled by scrubbers located externally; those buildings were not designed to accommodate any containment equipment internally.

In previous installations of the ChlorTainer vessels at other water utilities, where there was apparently significantly more room, whether there were scrubbers installed or not, officials had been pleased to note they did not have to construct a new building to accommodate the use of the new secondary containment vessel(s).

When the later use of the new containment technology in Houston was part of a much broader project of converting a facility's chlorine disinfection process to a chloramine disinfection process, a new, dedicated chemical feed building for the ChlorTainer and other equipment was designed and constructed, eliminating the crowding problem during cylinder changeout in much smaller buildings. And as an added assurance toward ease of use, the consulting engineers, from Lockwood, Andrews & Newnam, Inc.'s (LAN) Houston, TX location, collaborated with the containment vessel manufacturer on an optional innovation of adding an electronically controlled sled, with a push-bar, to move the cylinders during changeout, instead of having operators physically pushing them.

That innovation was not the first time the manufacturer had made a change that derived from user experience.

"We listen to operators, and we adjust accordingly," said Rudy Caparros, the COO from ChlorTainer/TGO Technologies, which is based in Santa Rosa, CA.

During the group interview, a chemical applications section chief noted that it was "fairly easy" for his utility mechanics and worker "to get up to speed on maintenance," for the change from a scrubber to the secondary containment vessel for leak safety. Annual maintenance, featuring lubrication of the vessel door's O-ring and chain, and related gears and clasps, took "about a day for two one-ton ChlorTainers," while occasional problems such as a door needing re-alignment were readily handled in consultation with the vessel manufacturer's literature.

He added that after two years of use of the containment vessel, safety had been enhanced by the end of occasional reliability issues with scrubbers, such as "not coming on when they were supposed to, due to alarm malfunctions, or tainted media causing a breakdown."

Further during the interview, an operations manager noted it was now "much easier for my guys to change the tons out. It was previously actually dangerous (in the undersized buildings), climbing around; I'm glad we got away from that."

He added that "now with the sled, with a push-bar, incorporated into loading and unloading of tons, operators don't have to physically push the tons into the ChlorTainers. It takes about 20 minutes to change a cylinder." He continued that even though the leak safety method "was now more labor intensive because it was no longer passive," the staff had become "less vocal" about the change, under the new conditions, and "understand and accept there will probably be more of these (secondary containment vessels) in the future. They appreciate they are much more user friendly in buildings built around them than retrofitted. And there is a bonus in containing any leak, so you can use the chlorine again."

In a comment after the group interview, Caparros added that the ChlorTainers were actually regarded as passive compared to the mechanically-operated scrubbers, and provided significant advantage in the preparation of risk management plans (RMP's).

A failsafe valve ties into the chlorine leak detection sensor, so that in the event of an external release, a nitrogen and electric powered failsafe valve will close, stopping it completely. Any leak or release of chlorine gas from the vacuum line downstream of a vacuum regulator (mounted on top of vessels) will lose the vacuum condition, and cause the vacuum regulator to close, stopping the flow of chlorine gas to the vacuum line.

In addition during the group interview, Sandeep Aggarwal, P.E., the manager of the groundwater facilities group within Houston's drinking water operations, noted that despite some reliability problems with scrubbers, such as occasional, readily handled, brief outages due to electronic control issues; concerns with the presence of caustic media with wet scrubbers, and sparking potential with dry scrubbers, the utility was committed to continuing to confidently deploy that technology for leak safety in various installations and facilities, while noting significant advantage deriving from use of the alternative secondary containment vessels.

"We were pleased to learn about this technology at a water conference, and have noted significant reliability and maintenance advantages through its use as an alternative to scrubbers," he said. "For example, when a 1970's era scrubber had ended its useful life, we deployed this technology as an alternative to a new scrubber, and found it more reliable and easier to maintain, without incurring higher capital cost."

ChlorTainer secondary chlorine containment vessels, supplied as part of complete installation packages, are manufactured by TGO Technologies, also known by its product name of ChlorTainer, of Santa Rosa, CA. The company provides units for both 150-1b. and one-ton cylinders, with a new vessel recently introduced to allow for two 1-ton cylinders in the same vessel.

The self-contained, simple, passive design means there are no pumps, fans, scrubbers, or caustic circulation systems, nor is there any need for backup electric power. The vessels are ASME-rated pressure tanks. Any leaks are recycled to the injection system at a normal flow rate. A failsafe valve ties into the chlorine leak detection sensor, so that in the event of an external release, a nitrogen and electric-powered failsafe valve will close, stopping it completely. If the power is lost, the failsafe valve will cycle closed, and will automatically cycle open when the power is restored.

With any accidental leaks of chlorine kept within the containment vessel, the gas may be recycled for use, or atmospheric venting is an option. Any leak or release of chlorine gas from the vacuum line downstream of a vacuum regulator will lose the vacuum condition, and cause the vacuum regulator to close, stopping the flow of chlorine gas to the vacuum line. The maximum release of chlorine gas will be the amount of chlorine gas that is in the length of the vacuum line to the chlorine injector, and not drawn into the water solution by the suction of the injector.

ChlorTainer provides safety containment, not only for chlorine gas, but also for sulfur dioxide and anhydrous ammonia as well.

The vessels' life expectancy is stated as no less than 100 years, given proper maintenance. This features annually changing out the Viton O-ring on the door, which takes about half an hour, and approximately $200. Further information about ChlorTainer is available from Chlortainer/TGO Technologies Inc., www.ChlorTainer. com, (800) 543-6603, sales@ChlorTainer.com.