

Public Water Wholesale District 23 Takes Advantage of Special Secondary Containment Vessels for Chlorine Gas Cylinders

John Hodgden, who previously was General Manager for Public Wholesale District No. 23 based in Wilson County in southeast Kansas credits the use of special secondary containment vessels for chlorine gas cylinders to allow for a cost-effective switch from sodium hypochlorite (a/k/a NaOCl, bleach) to chlorine gas during the design of a new 6-MGD surface water treatment plant. He also credits the vessels' manufacturer for especially critical and timely assistance during startup under crisis conditions.

"Like any project, you eventually get to see the price tag, and start looking for where you can save dollars," recalls John Hodgden. "We were originally planning on feeding bleach, with the original cost of tanks and equipment to feed it cheaper than gas, but when we looked at how much chlorine we needed to feed and how much to budget for chemical costs, we calculated we could save about \$25,000 to \$30,000 annually on chlorine by using gas."

"We saw that those savings could cover the increased cost of equipment within ten years, and the life of the new plant

is estimated at 40 years. The long-term savings made sense, and we have seen the annual savings fall in the range we calculated, depending on how much water we use."

Hodgden's 22-member wholesale district has a six county-wide distribution system, serving a combination of six small cities and 14 rural water districts (RWDs) with a total population of 17,000 to 20,000 and includes agricultural and commercial outlets. The design of the 6-MGD plant, which began operation in 2019, currently sees an average winter flow of about 1 MGD, increasing to about 1.5 MGD in the summer during the farming season.

A previous 1.2 MGD plant was running at full capacity and is no longer in service.

"We were planning on starting up the new plant in the fall of 2019," Hodgden continues, "but a flood in the spring ruined the old plant; the clearwell was cracked on all four sides. Our water towers were on the verge of going dry, but people don't stop drinking water just because your plant crapped out. Myself, our Dustin Rose, and our engineer, Danny Coltrane with Midwest Engineering in Tulsa, OK, pretty much lived at the new plant to get everything going sooner."

"The chlorine containment vessels were already on site, and the manufacturer was really good about being on the phone with me, walking me through how to hook them up; there was no time for them to come out. We installed them, running all the wires

ChlorTainer's failsafe valve is powered open using nitrogen and electricity. If the power is lost, the failsafe valve will cycle closed and will automatically cycle open when the power is restored.



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and tubing, and their project manager and another guy visited later to check everything out, while others in their office continued to be helpful. I'm very thankful and appreciative for them helping us get through fighting to keep water in the towers, and starting up the new plant ahead of schedule in May, 2019. I would absolutely recommend them, and have."

Before joining the wholesale district, Hodgden had served for 15 years as a water treatment plant superintendent and, after that, was a sales and support representative for a treatment chemicals manufacturer, so he was already familiar with the use of chlorine treatment and how gas was often avoided, despite the savings available.

"There were lots of people using bleach (instead of gas), paying a lot more for chlorine, just because they didn't have to buy as much safety equipment," he recalled. "The state of Kansas requires a separate room, an exhaust fan, and several other odds and ends that add up. In rural areas, they didn't have that up-front



Two one-ton ChlorTainer secondary containment vessels for chlorine gas cylinders were installed, in the room originally designed for the bleach tanks and associated equipment, to help allow for safe delivery of 160 ppd of chlorine for pre-and post-injection feeds, as well as helping for safe changeout of spent cylinders. The compact installation left plenty of room for a shop for trucks and backhoes, negating the need for a separate shop building.

money, so they would just buy a tank and a pump, and pump the bleach straight into the water line. That way it was easier to get by the Kansas Dept. of Health and Environment (KDHE) and all the things they make you do."

Looking back on one of the design meetings for the new plant, Hodgden remembered a key discussion.

"We knew we could save a bunch of money using gas, delivering 100 percent chlorine, compared to only 1.25 lbs of chlorine per gallon of bleach, and end up (effectively) paying \$2.50/lb. for it," he said. "I volunteered going with gas, while asking how could we get around what KDHE wanted."

"Our engineer said he had seen the (special secondary containment) ChlorTainer®; he gave me their contact info. They asked about the size of the plant, how much chlorine we were feeding, and what kind of floor plan was available for their vessels. They emailed back a quote and how the room would look. The whole process, changing direction

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(from the bleach installation in the draft design), didn't take very long at all."

Hodgden added there was another benefit from the compact vessels installation in the new building that was originally designed to contain two 6500-gallon-bulk tanks for bleach.

"We sectioned off one corner, and there was enough space left to build a shop," he noted. "We saved so much space we ended up not having to purchase another shop building for trucks and backhoes."

About 54 percent of the new plant's total cost was paid for by U.S. Dept. of Agriculture (USDA) Rural Development (RD) loans, and 44 percent by USDA grants. The ChlorTainers purchase was included in USDA funding.

The secondary containment vessel manufacturer, Chlortainer/TGO Technologies, Inc. of Santa Rosa, CA, has announced that since the time of the installation at Public Wholesale District No. 23, "the neighboring cities of Parsons, Independence, and Garnett, as well as the Miami County Rural Water District No. 2, have also chosen to implement Chlortainers, to protect their operators and their surrounding communities."

At the new Wholesale 23 plant, two one-ton ChlorTainer secondary containment vessels for chlorine gas cylinders were installed in the room originally designed for the bleach tanks and the associated equipment to help allow for safe delivery of 160 ppd of chlorine for pre-and post-injection feeds, as well as helping for safe changeout of spent cylinders.

The 500-ppd vacuum regulators mounted on the vessels connect to a valve wall panel. Water flows through a chlorine ejector and into a wall-mounted control panel before traveling to whichever feed point it supplies

"The ChlorTainers are bullet-proof, maybe literally," Hodgden added. "I have had zero issues with them. We do the annual maintenance, and that's about it. When starting up this new facility, we had 8 various chemical feed systems to get online. Of those systems, the chlorine feed was the easiest, and has presented the least number of issues."

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.

ChlorTainer's failsafe valve is powered open using nitrogen and electricity. If the power is lost, the failsafe valve will cycle closed and automatically cycle open when the power is restored.

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 enclose chlorine gas cylinders, the chlorine transfer hose, and seismic lock-down brackets. The chlorine transfer hose is attached to the supply valve, pressurized, and tested for any

leaks at the hose ends. Then the door is closed and secured by a clamshell locking mechanism.

Operators switch to the standby containment vessel automatically when the full cylinder runs empty, opening the vacuum breaker valve. The switch-over is performed automatically and does not require personnel to be present. With any accidental leaks of chlorine kept within the containment vessel, no atmospheric venting is generated.

The vessels are ASME-rated pressure tanks, and 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, the nitrogen failsafe valve will close, stopping it completely. 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 for sulfur dioxide and anhydrous ammonia as well.

The life expectancy of the vessels 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 of time and costs approximately \$200. Further information about ChlorTainer is available from Chlortainer/TGO Technologies Inc., www.ChlorTainer.com, (800) 543-6603, sales@ChlorTainer.com, 3641 Turnberry Circle, Santa Rosa, CA 95403.

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