

WWTP Upgrades to Activated Sludge; Takes Advantage of Special Secondary Containment Vessel for Chlorine Gas Cylinders to Continue Compliance and Safety, for Disinfection Using Gas

First-Time Users in Their State; Report Good Results

By **Cliff Lebowitz**, Principal and Editorial Director at Catalytic Reporting, LLC,

The plant superintendent for a now upgraded, 3-MGD, earthen-aeration basin, activated sludge wastewater treatment plant (WWTP), reports successful installation and first-year and a half use of a special secondary containment vessel for chlorine gas cylinders, allowing for continuing regulatory compliance and operational safety, using chlorine gas for disinfection.

The new plant, fully online since July, 2021, is an upgrade on the same site of a former 1975-online aerated lagoons, secondary clarification operation, and featuring chlorination in clarifiers changing to chlorination in a chlorine contact tank. Chlorine feed rate has remained in the range 15-50 lbs./day, and an average of 40 lbs./day, and using 150-lb. chlorine gas cylinders has also remained the same.

"There is some apprehension out there about using chlorine gas, but we had been using it right along, for a long time, without incident, and it didn't make a lot of sense to re-invent the wheel," said the superintendent, Chris Cossette. "This technology was the most cost-effective way to get the new plant into compliance while continuing to use gas, and it's been a good solution for us."

"We were operating safely with chlorine gas, and in compliance, for a long time, originally with one-ton cylinders, and then with 150-lb. bottles," he recalled. "Vendors didn't like trucking what they called one-ton bombs, and there were regulatory issues regarding how many of those you could have on site, and how much they could hold, but in any case without any requirement for secondary containment. "But things changed by the time we started a major upgrade to activated sludge in 2019, especially including that we could no longer chlorinate in the clarifiers, and we also had to change the way we handled cylinder use and storage."

"Our engineers, Fishbeck, out of their Grand Rapids, MI office, had read about the ChlorTainer™ technology in a trade magazine ad, and they evaluated it against alternatives, before recommending it as the most appropriate containment against possible leaks, and overall the most cost-effective option for continued compliance," Cossette continued. "That included not needing to build any new structure to accommodate it, and to get fully up to date with regulations changes and compliance, while getting the best bang for your buck."

"We were able to start using it as soon as the new chlorine contact tank was operational, while the old treatment system was still mostly in place, and as the rest of the plant upgrade was being completed. There was a learning curve; we stubbed our toe a time or two, but overall, it's gone pretty well. Within the first couple of months, we got more and more comfortable with it."

The special ChlorTainer secondary containment vessel for chlorine gas cylinders is manufactured by ChlorTainer/TGO Technologies of Santa Rosa, CA, and is provided as part of a complete package for its use. The company also provides single and dual units for one-ton cylinders.

The installation at the Ludington plant was its first use in that state.

"It took a couple of weeks getting used to it, with our mechanical contractor leading the way on that, as we continued with numerous other aspects of the comprehensive plant upgrade," Cossette continued. "We've gotten the hang of it, and it's been as smooth as anything gets, for over a year and a half now."

"There was the usual old dogs and new tricks situation, and some frustration, but whatever alternative solution to the updated compliance requirements might have been

undertaken, it could easily have been much more difficult. This works fine; really a very simple, straightforward piece of equipment; we've easily used spare parts that came with it, and received support from the manufacturer when needed, responding to any issues we brought up to them. They've supported their product very well. If someone was in similar circumstances as mine and they judged this technology fit their needs, I wouldn't hesitate to recommend it."

The installation features one Dual ChlorTainer, scale-mounted, that holds two 150-lb. cylinders, and fits easily in the same 15 ft. x 25 ft. room that has long been used for cylinder storage, and as the start of the plant's chlorination process. Each cylinder has its own vacuum regulator on the top of the vessel. One cylinder is deployed at a time, with the need for changeout alerted by the scale, and accomplished by the easily-trained plant operators, which was assisted by a site visit by the manufacturer.

"That training took maybe an hour, hour and a half, in the same day," Cossette said, including himself as well as his four operators. "The changeout takes just 10 to 15 minutes, to close the valves, tilt the unit to completely horizontal, and move the cylinders on a mobile conveyor-style, roller-loader, which also tilts, and was supplied as part of the package, and is easily rolled into position when needed."

The mechanical contractor, which specializes primarily in equipment installations and related work for municipal

water and wastewater treatment plants, reports that installation of the special secondary containment vessel, and related equipment, for the first time in his state, was "once we got all the details and some clarifications, straightforward and easy."

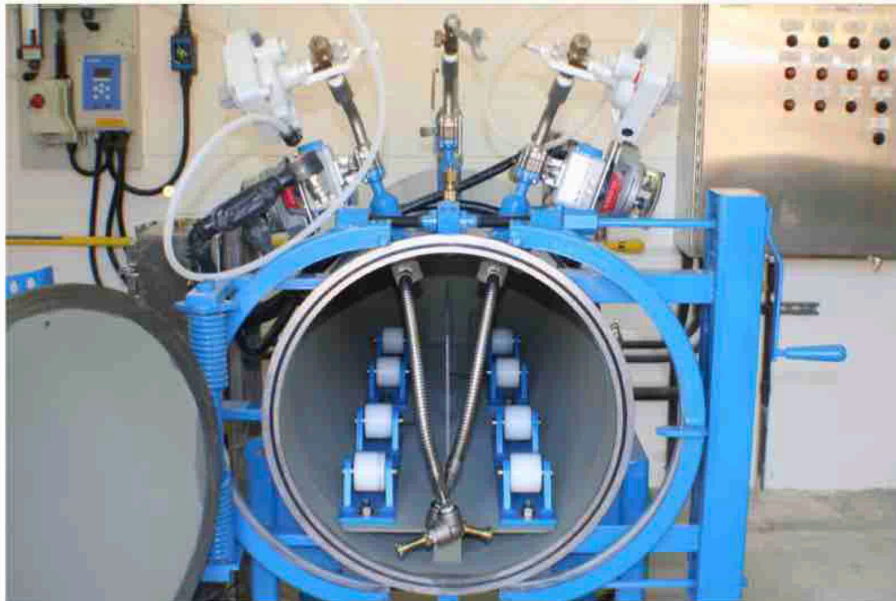
"Nobody in Michigan had ever seen one before, so that was a hump in the road to get over," said Matt Fuller, now the service manager for Franklin Holwerda Company in Wyoming, MI, and who was the foreman at the time for the complete plant renovation project that was performed by his company. "Once we had all the details in front of us, and everything was clarified, we just needed to familiarize ourselves with it and get going, and it was pretty straightforward and easy to install."

The plant renovation project also included a new headworks in a new building; redesigned treatment ponds; and a new chlorine contact chamber, among other features.

"That vessel installation part of the job was come and go, altogether taking about one week from start to finish if we had stayed right with it, needing two pipefitters primarily, and occasionally an electrician a little bit," he recalled. "Outside of that, the vessel vendor connected us with his weight sensor and control box subcontractors, which were part of the package along with the containment vessel. When we needed some help there, there was plenty of information from him, and them, to get us headed in the right direction; about 6-8 additional hours for me on the phone and going through the ChlorTainer spec book."



The installation of the special secondary containment vessel for chlorine gas cylinders at the Ludington, MI, WWTP was the first use of the innovative technology in that state. From left to right are Kyle Bond, Water Circuit Rider for the Michigan Rural Water Association; Plant Operator John Dickinson; Plant Operator Jared Beyer; Plant Operator Kevin Taranko; Plant Superintendent Chris Cossette; and Plant Operator Gary Walton.



The special secondary containment vessel, like this one, holds two 150-lb. chlorine bottles, and has gas pressure regulators mounted on top. It is housed about 80 ft. away from the chlorine contact chamber in the separate building that was already in use for storage and connection of the bottles; no new building was needed. A header and a series of flow control valves send the chlorine to be injected into the 40 ft.-square, open chlorine contact chamber.

The vessel holds two 150-lb. chlorine bottles, and has gas pressure regulators mounted on top. It is housed about 80 ft.

“Then we made a couple of brief extra site visits, which they helped us with remotely, to be sure the pressure regulators were installed correctly and working properly. The electricians were slowed down a bit because they hadn’t seen the controls before, but they just needed to get familiar with them.”

away from the chlorine contact chamber in the separate building. A header and a series of flow control valves send the chlorine to be injected into the 40 ft.-square, open chlorine contact chamber, that holds about 12 ft. of clarified water, which is then discharged as chlorinated final effluent.

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“When we were finished,” Fuller concluded, “everything worked as it should have. It’s definitely a good application compared to what this facility had before. Their chlorine injection prior to this, they would stand two bottles inside a room, connect them up to the regulators, hit go, and then lock the door. As far as a safety measure goes, this is far better than what they had. If it does have a leak, it is captured for re-use, or they can vent it.”

The 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.

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 clam-shell locking mechanism. With any accidental leaks of chlorine kept within the containment vessel, it may be recycled for use, or atmospheric venting is an option.

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 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 of time and 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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