



Sidestream Injection



Water District No. 1 – Johnson County, Kansas Tom C. Hansen Water Treatment Plant *Sidestream Injection & Pipeline Flash Reactor System*

THE PROBLEM: Customer health and safety have always been WaterOne's top priority. They not only work to meet current drinking water regulations...they strive to anticipate and exceed regulations of tomorrow. With this forward-thinking attitude, they began planning for the possibility of bacteria, viruses, and pharmaceuticals showing up in their source water—water from the Kansas River and Missouri River. They wanted to stop the problems before they started.

While they were examining the different options, they decided to add one more criterion into the mix—providing consistent, good tasting water. Although WaterOne has always provided completely safe water to its customers, agricultural runoff and seasonal conditions in the Kansas River and Missouri River occasionally affected the taste of the drinking water, so consistent, good tasting water was an additional goal.

THE SOLUTION: WaterOne chose to go with ozone as its primary means of disinfection. Ozone is a powerful natural disinfectant and offers effective treatment for

bacteria, viruses, pharmaceuticals, AND taste and odor compounds. In addition, integrating ozone into the water treatment process would make WaterOne's operations more efficient by reducing water treatment chemicals and processes.

Mazzei Injector Company was selected to supply the ozone mixing and contacting systems for the two parallel water treatment plants at Hansen, one with a capacity of 56 MGD and the other with a capacity of 127.5 MGD. To determine the optimal configuration for these systems, Mazzei utilized in-house computational fluid dynamics modeling. The resulting setup involves onsite ozone production, which is introduced and thoroughly mixed into a fraction of the mainline water flow via a sidestream injection (SSI) system. This system incorporates assorted sizes of venturi injectors, which provides operators the flexibility to precisely dose ozone according to the changing water conditions. This treated water is then effectively blended into the main flow through a 54-inch Pipeline Flash Reactor (PFR) at one facility and an 84-inch PFR at the other. Subsequently, the ozone-treated water proceeds through the remaining stages of the treatment process.

THE RESULT: Following the commissioning of the new ozone systems, both plants achieved a 95% ozone transfer efficiency across the design flow and dosage range. The ozone was thoroughly mixed with the main flow, effectively destroying viruses, bacteria, and pharmaceuticals, while simultaneously neutralizing taste and odor compounds. Due to the flexibility of the SSI/PFR systems, WaterOne operates seamlessly, even with a flow turndown ratio of 12 to 1, all while upholding treatment objectives. And by burying the PFRs, all this was accomplished without expanding the existing campus. Maintenance for the new ozone systems is easy since the pumps and equipment are conveniently located on the operator's deck, eliminating the need for confined space maintenance required by fine bubble diffusers.

The integration of ozone into the treatment process has yielded several benefits: effective treatment for pharmaceuticals and emerging contaminants in the source water, consistently great tasting water regardless of seasonal variations in the source water, and substantial operational cost savings due to reduced power consumption, elimination of powdered activated carbon feed, and decreased reliance on costly chemical additives. In 2021, WaterOne was declared "America's Best Tasting Drinking Water" in a nationwide competition sponsored by the National Rural Water Association (NRWA) and was also honored as the "Best Tasting Water in Kansas" by the Kansas Section of the American Water Works Association (KsAWWA).



Pipeline Flash Reactor

Pipeline Flash Reactor - buried



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