




Mazzei[®]
CASE STUDY

City of Toledo
Collins Park Water Treatment Plant
Venturi Sidestream Injection with Pipeline Flash Reactors

THE PROBLEM: For over 75 years, the Collins Park Water Treatment Plant (WTP) has served the needs of over 500,000 residents in the Toledo, Ohio area by providing safe drinking water. Sourcing its water from the western basin of Lake Erie, the plant faced challenges in 2014 when the lake garnered attention due to recurring toxic algal blooms. These blooms posed threats not only to recreational users but also to those consuming the water, as algal toxins are hazardous both upon contact and ingestion. Consequently, the professionals at the water treatment facility found themselves under significant pressure to safeguard the community from the potential infiltration of toxic compounds and other contaminants that could arise from these harmful algal blooms in the source water.

THE SOLUTION: The optimal strategy for controlling algal toxins was determined to be a multi-barrier approach, with ozone playing a crucial role due to its strong oxidizing properties, particularly effective during harmful algal bloom events.

As part of a 40 million gallons per day (MGD) plant expansion project, the implementation of ozone involved the construction of two identical ozone contactor buildings, each equipped with two dissolution basins. To effectively introduce and mix ozone into the water treatment process, a system comprised of a combination of venturi sidestream injectors and Pipeline Flash Reactors™ (SSI-PFR) was selected. This choice was driven by its remarkable mass transfer efficiency of over 95% and its minimal footprint, a critical consideration given space constraints at Collins Park. The system had to be accommodated between an existing recarbonation basin and a bank of filters. The SSI-PFRs, requiring only a few feet of pipeline for mixing, were strategically placed in a compact three-story stack to minimize physical space requirements.

Each basin within the contactor buildings is equipped with two sidestream pumps and an additional common standby pump. There are three venturi injectors—comprising a lead, lag, and standby injector—employed in each dissolution basin, each with a capacity of 22

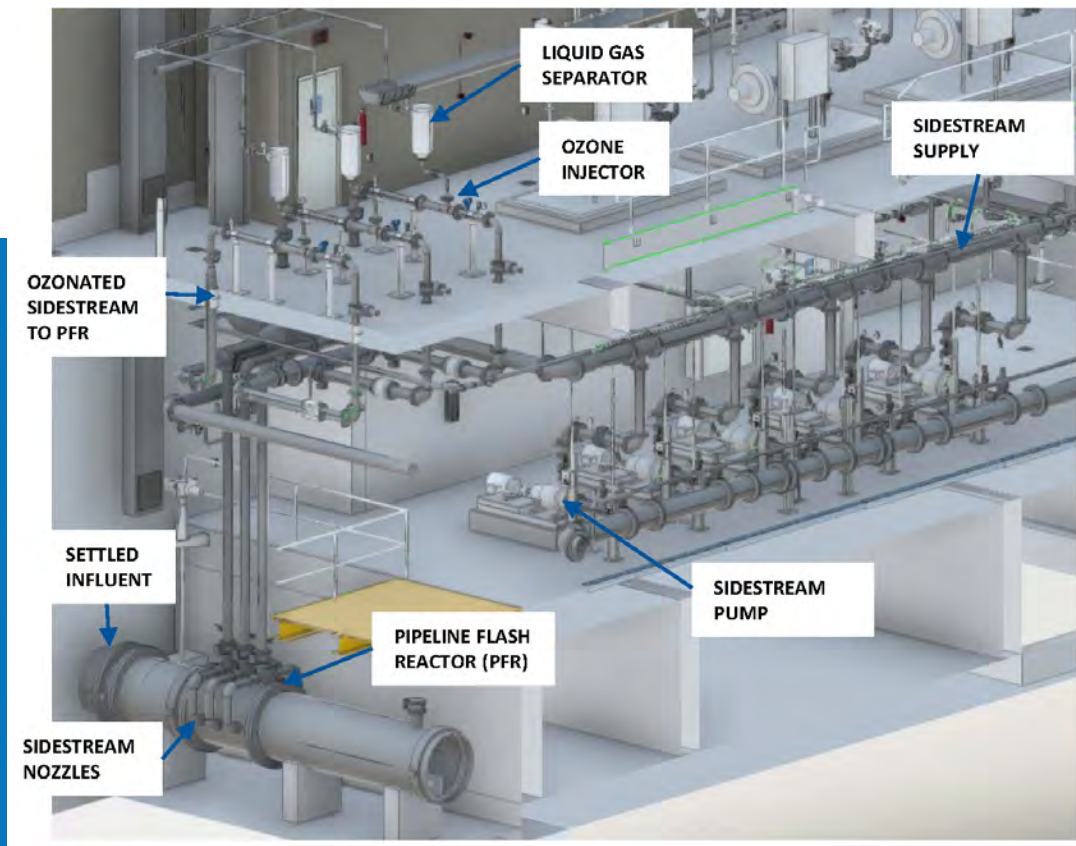
standard cubic feet per minute (scfm). There are a total of twelve sidestream injectors across the project. Additionally, each basin is outfitted with a dedicated PFR featuring three sidestream manifolds, totaling four PFRs. Basin effluent is directed from the injectors to the respective PFRs for further treatment.

THE RESULT: The ozone treatment facilities at the Collins Park Water Treatment Plant, serving the City of Toledo, commenced operation in June 2021. Employing a multi-barrier approach featuring powdered activated carbon (PAC), ozone, and chlorine, the system effectively eliminates 99.7% of toxins.

Beyond its pivotal role in addressing algal toxins, ozone offers several additional advantages at the plant:

- Management of taste and odor issues,
- Elimination of endocrine disrupting compounds (EDCs),
- Removal of pharmaceuticals and personal care products (PPCPs),
- Decrease in disinfection by-products (DBPs),
- Reduction in the use of polyaluminium chloride (PAC).

The decreased reliance on PAC for taste and odor control has led to reduced operating costs. The previous annual expenditure of \$1.9 million for PAC treatment significantly surpasses the estimated annual operating cost of \$340,000 for ozone.



Rendering courtesy of Black & Veatch

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