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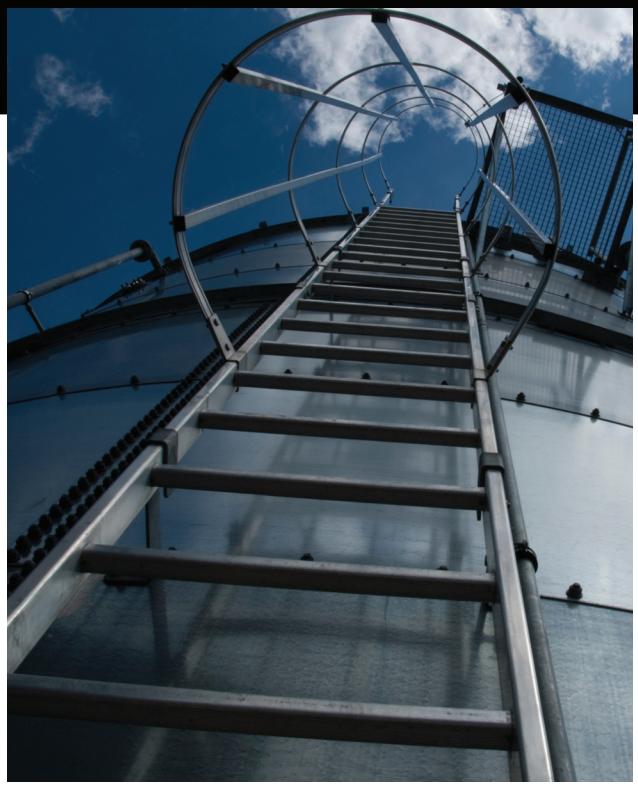
PAX TRS™ ENGINEERED THM REMOVAL SYSTEM



SOLUTIONS THAT WORK

PAX TRS™ Trihalomethane Removal System

THMs - A Growing Challenge for Municipal Water Systems

Trihalomethanes (THMs) are chemical compounds that form when natural organic matter in water reacts with chlorine during the disinfection process. THMs are a suspected carcinogen and regulated in many countries. Exceedence of the Maximum Contaminant Level (MCL) for THMs are among the most common violations of the EPA Stage II DBP rule in the United States.

While most THM removal technologies involve large-scale changes to the water treatment plant, the PAX TRS™ Trihalomethane Removal System is a custom-designed, energy-optimized system of mixers, aerators and ventilators that converts ordinary water storage tanks into water treatment systems.

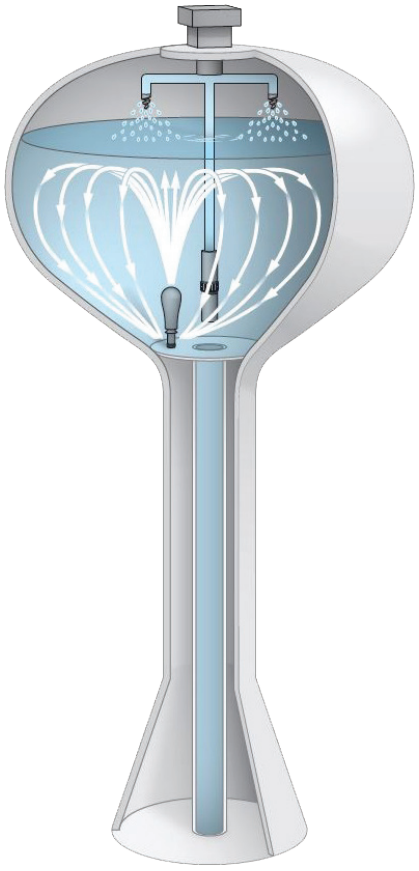
This targeted approach allows for quick and cost-effective installation that achieves compliance goals.

Benefits of PAX TRS™

- Custom-designed system for precise THM removal rates
- Energy-optimized for low operating cost
- Scalable designs for tanks 50,000 gallons to 50 million gallons

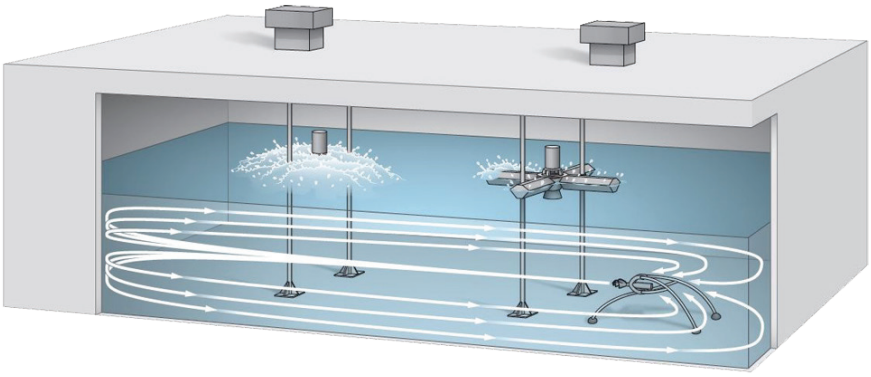
Features

- NSF61 approved materials
- Active headspace ventilation creates ideal conditions to volatilize THMs
- Robust equipment including non-clogging aeration nozzles and reliable surface aerators



Active mixing and ventilation are the first steps in THM removal. The PAX Mixer continually introduces THM-concentrated water to the surface where THMs are volatilized and evacuated.

Customized aeration systems provide high rates of mass transfer to volatilize THMs out of any size or shape tank.



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Overview Control Panel

Custom Integrated Control Panels

The Integrated control panel brings the controls for aeration, air handling, and mixing systems into a single, high quality control panel that meets the specific and unique standards of each customer. From a bare bones set of motor starters, to custom programed PLC based panels, we have the experience and expertise to understand your controls requirements and deliver plug and play panels that minimize field wring. With our standard offering featuring Allen Bradley components, we can provide the right level of customization. Options Include:

- **PLC Manufacturer:** Allen Bradley, Siemens, GE, IDEC
- **Enclosure Type:** NEMA 3R, NEMA 4X, Deadpanels, Sunshades and more.
- **Active Feedback Control:** Integrate an on-line THM sensor to continaully monitor THM concentration in the tank effluent, and save energy and run time by turning off equipment when THM treatment is not needed.

Enhance Performance & Energy Efficiency

The Neptune-Toolbox™ Model

When it comes to selecting the right THM removal system for your tank, custom design is key. Optimizing system design is critical for predicting and achieving THM removal rates, minimizing energy requirements and calculating long-term operating costs.

cleanwater1 partners directly with municipalities and engineers to diagnose THM formation and perform a system-wide treatment analysis. This data, together with our proprietary design and performance modeling software, Neptune-Toolbox™ enables us to create in-tank aeration systems that are cost-effective and energy-optimized. The result is right-sized THM removal technology for your specific tank's needs.

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Using water storage assets as a starting place to affect the removal of THMs from water distribution networks makes sense from both a hydraulic and chemical engineering perspective. Each water distribution network will experience unique THM formation characteristics which dictate the level of THM formation through the network over time.

Water characteristics such as water age, temperature, disinfectant concentration, and disinfectant residual type all influence the formation of THMs. As a result, we have developed a robust model called Neptune-Toolbox, that considers the factors that contribute to THM formation in water systems and helps derive an engineered THM removal solution that meets client needs for THM removal.

Energy consumption is often the most significant factor in a system's total cost over a period of years. The Neptune-Toolbox™ model determines whether the energy consumption tradeoff is worth the initial equipment cost. It can provide a series of equipment recommendations based on client circumstances and requirements.

"We are seeing THM levels 40-70% lower leaving our tank than those coming in."

Adam Feffer, Water Quality Engineer, San Jose Water Company, California

Our Secret to Cost-Efficient THM Removal: Ventilation, Active Mixing and Modeling

Headspace ventilation devices, are critical to ensure that THMs which volatilize into the tank's headspace are efficiently removed from the tank.

PAX Mixers assist in removing THMs by continually pushing water up to the surface where the THMs can evaporate out of the water and into the headspace of the tank.

Modeling enables our engineers to use tank volume, fill/drain cycle, geometry and THM speciation to derive an optimal mixer energy input. With this information, our engineers will recommend available mixer form factors, aeration devices and ventilation combinations to ensure optimal THM removal.

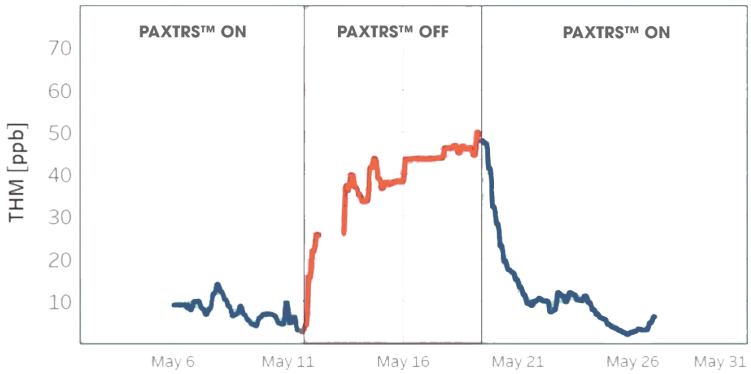
"The PAX TRS™ system was easy to install and performed well by delivering a level of THM removal that helps ensure our system compliance."

Tyler Foxton, Project Engineer
Manitoba Water Services Board, Canada

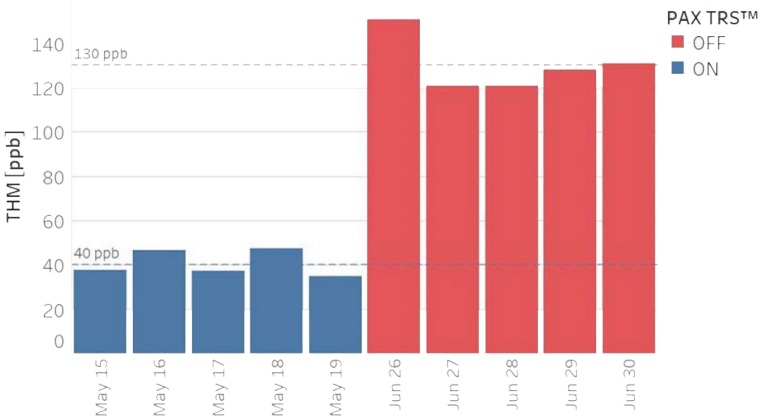
Success Stories From Climate Extremes

San Jose, California

During the multi-year drought in California, San Jose Water Company's sophisticated monitoring program anticipated an increase of THM precursors developing in its system due to deteriorating water quality. To prepare, it installed a system of PAX Mixers and a custom air-handling unit to maximize THM removal inside the tank. Staff were impressed by the speed of project completion and "excellent results from the system."



Tank Size: 12 MG
Tank Type: Underground
THM Removal Achieved: 40-70%



Manitoba, Canada

In 2016, the Manitoba Water Services Board issued a requet for a pilot study to asses whether THM aeration could acheive high removal rates of THMs in a cold weather environment. Our team was selected to perform a multi-year pilot test of surface aeration, with heated forced headspace ventilation to allow operation during extreme cold temperatures. After 18 months of continuous operation, the PAX TRS™ system acheived an average 70% reduction of THMs in the reservoir, and kept THM levels low thorughout the distribution system downstream of the treatment tank.

Tank Size: 0.1 MG
Tank Type: Underground
THM Removal Achieved: 70%

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