

CASE STUDY

WESTERN AUSTRALIA

PAX TRS™ THM Removal System Successfully Employed in Australia to Remove Over 32% of Trihalomethane (THM) Species in the 10 ML (2.6 MG) Rosslyne Water Storage Tank



Western Water's Rosslyne Water Filtration Plant Storage Tank

OVERVIEW

Around the world, drinking water regulations restrict the level of potentially carcinogenic trihalomethane (THMs) species in water distribution systems. Australian Guideline (ADWG) levels are set at 0.25mg/l (250 ppb).

In many regions of Australia, the conditions for high THM formation rates are exacerbated by warm summer temperatures. This combination accelerates the reaction of free-chlorine and naturally occurring organic material (NOM) in finished water. This produces unwanted THM chemical species. Disinfection by-products (DBPs) form in distribution systems over time where chlorine disinfectants interact and react with organic material.

THMs are the most common DBP in water distribution systems. As water age increases, THM formation progresses as well. (Water age refers to the time from water treatment in a plant to ultimate use.) Water utility operators are required to closely monitor their system's running THM average to ensure compliance with regulatory limits.

Western Australia has the largest desalination plant in the Southern Hemisphere, located in the city of Perth. The plant can produce up to 100 billion liters of drinking water per year.

SITUATION

Western Water delivers 16.5 gigalitres (4.4 billion gallons) of water annually over 2,100 km (approximately 1,300 miles) of distribution and transmission piping to towns in the Melbourne area.

General water scarcity, as well as seasonal availability, require Western Water to have access to multiple and diverse water sources. Sources include local reservoirs, wholesale water from Melbourne and a sophisticated water recycling program.

Unfortunately, each water source has the potential to have THM formation depending on the level of organic material in the water. Western Water found that depending on the source, THMs could reach the upper limits of ADWG in the summer months.

After repeated attempts to reduce the organic load by using activated carbon in the water treatment plant, the utility and their consulting engineer decided to examine aeration in the distribution system to mitigate THM levels.



APPROACH

Western Water, and their engineering team, decided to deploy the PAX TRS™ (THM Removal System) in the 10 ML (2.6 MG) Rosslyne Tank. Their goal was 30% THM removal.

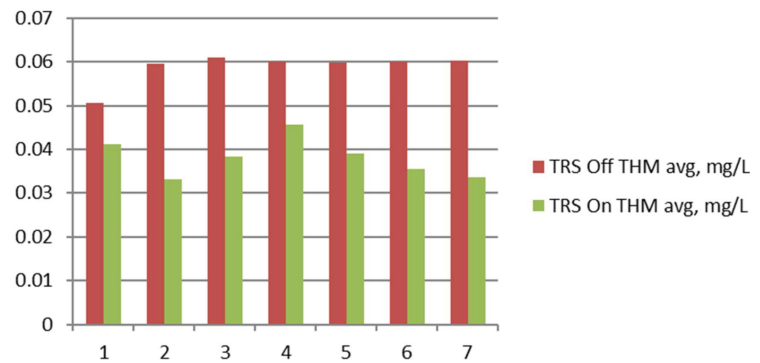
The concept of utilizing aeration to remove THMs is based on the principle that THMs are volatile and can be encouraged to leave the water (liquid phase) into air headspace of the water storage tank (gas phase) based on Henry's Law. By using a water storage tank as an intervention point, the process of volatilizing THMs is aided by the opportunity to deploy the proper equipment and treat a large volume of water.

In order for Western Water to meet their 30% THM removal goal, they customized their THM removal system as follows. They invested in:

- PAX Impeller tripod tank mixers
- Two surface aerators (for additional mixing energy and mass transfer capacity to get THMs in the water to volatilize into the air)
- Tank ventilation to sweep the THM-laden air into the atmosphere.

Validation tests were conducted once reservoir water levels were acceptable. Validation tests are a simple system of on-off tests with time allowed in the "off" position so THMs can form and time in the "on" position so the PAX TRS™ system can remove THMs and achieve equilibrium.

PAX TRS™ validation test results show that when PAX TRS™ is on, THM averages are lower than when it is off.



RESULTS

24/7 OPERATION TIME | **36%** REDUCTION In THMs

- The PAX TRS™ THM Removal System surpassed Western Waters' goal of removing 30% of THMs by removing 36% after the first test.
- It only took a couple of days for PAX TRS™ to achieve its lowest levels of THMs. This lower level remained consistent.
- PAX TRS™, accompanied by PAX mixing technology, enabled Western Water to run the equipment 24/7.
- Minimal maintenance was required to operate the PAX TRS™ THM Removal System .

CONCLUSION

The PAX TRS™ THM Removal System demonstrated to Western Water that it could achieve and exceed the 30% THM removal goal it had set out for itself.

The consistently lower level of THMs and the easier maintenance schedule, made investment in the PAX TRS™ THM Removal System an excellent choice for Western Water.

Rosslyne Tank's Two Floating Surface Aerators



To access our full assortment of case studies, data sheets, brochures and more, visit our document library at <https://documents.cleanwater1.com> or scan the QR code.

