

CASE STUDY

# Manitoba Water Services

**PAX TRS™ THM Removal System Successfully Removes Over 65% of Trihalomethane (THM) Species in Water Storage Tank at the End of 60-Mile Transmission Line**



## OVERVIEW

In Canada and all the western United States, long treated water transmission lines are frequently utilized to convey potable water to rural communities. These long transmission lines combined with chlorine for water disinfection can often create conditions that lead to disinfection byproducts (DBPs).

One of the most common DBPs is a family of volatile compounds called Trihalomethanes (THMs). THMs are regulated in Canada to a level of 100 ppb (parts-per-billion) annual average and in the U.S. to a level of 80 ppb.

THMs form in distribution systems over time with chlorine disinfectants (added to prevent harmful biological growth) and in the presence of naturally occurring organic material with increasing frequency as water temperatures rise. As water age increases (the time from water treatment in a plant

to when it's used), THM formation tends to increase as well. For this reason, water utility operators closely monitor their system's running THM average.

*The Manitoba Water Services needed a solution to manage THM levels so that water quality was preserved across a long transmission lines.*

## SITUATION

In order to dive into this deeper, the Manitoba Water Services Board issued a request for a THM pilot. They wanted to assess whether available technologies could mitigate THM formation in its Plumas Tank. The Plumas tank is roughly 100,000 gallons (400 m<sup>3</sup>) in volume.

Because the Board observed steady increases in THM levels of over 200 ppb and were already testing the removal of soluble organic material (one of the THM precursors), they realized that the detention time in the tank and the inherent water age in a 60-mile (96-km) pipeline would lead to a significant level of THM formation, even with organics removed.

They decided to perform a one-year pilot to test the process of stripping THMs from the Plumas tank.



# APPROACH

The PAX TRS™ THM Removal System was implemented to for the one-year pilot. The goal was to strip THMs from the Plumas tank. With over 150 systems in operation, PAX Water Technologies, a cleanwater1 company, had significant experience in utilizing water storage assets as intervention points to eliminate THMs in distribution systems.

The PAX TRS™ system uses the water reservoir as a reaction vessel to enhance the volatilization of THM compounds from the liquid phase (water) into the gas phase (headspace of tank) and move them out of the tank.

The PAX TRS™ system includes submerged mechanical tank mixers, rooftop ventilation units and water surface aerators. Each component plays a role in moving THMs from being trapped in the tank water to into the headspace and ultimately out of the tank.

By utilizing Henry's Law and various mass transfer principles, Neptune-Toolbox™ looks at tank hydraulics, mass transfer, THM loading, THM diffusion rates and energy consumption to develop the optimal system design for a particular tank. The equipment selection tool enables the engineering team assess the ideal capital equipment and power to achieve desired THM removal rates. Due to the sub-zero temperatures, the team added an air heater to the PowerVent® ventilation unit to ensure that frigid air was not blowing into the tank during the winter and creating unwanted icing issues.

# RESULTS

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**65%** **REDUCTION**  
In Trihalomethane (THMs)

# CONCLUSION

After three days of installation and commissioning, the PAX TRS™ unit started-up and delivered results. The installation validation data shown in the graph shows that the system is delivering 69% reduction in TTHMs.

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**"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,  
The Manitoba Service Board**

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**Summer period illustrating 69% THM removal rates in Plumas Tank**

