**Case Study**
USNHPW-459.001

# Nitrification Control in a 4MG Distribution Tank

**Topics:** residual monitoring/boosting, nitrification, chloramine, water age, distribution tank, potable water, chlorine

The ResidualHQ® Automated Disinfectant Control System is proven to be an important tool against nitrification issues.

## Location & Contact Information:

Further information may be available upon request. Please contact Ixom Watercare by phone at +1 866-437-8076 or by e-mail, watercare@ixom.com

## Tank Overview:

- Volume: 4MG
- Type: Cylindrical Ground Storage
- Construction: Concrete
- Height: 25 feet
- Diameter: 185 feet
- Maximum Fill Rate: 3200 GPM
- Average Daily Inflow: 1.76MG
- Disinfectant Type: Chloramine

## Pre-Deployment Conditions:

Summer 2020: A widespread and difficult to resolve nitrification event occurred in this system and it was especially pronounced in this tank. The cause was likely due to a combination of factors including:

1. COVID-19 staffing issues which led to a significant decrease of system flushing
2. high water age due to a drought and
3. the existing tank mixer being inadvertently turned off

Subsequently, an elevated rate of monochloramine decay and elevated ammonia levels were observed after the Summer 2020 nitrification event subsided.

Winter 2020/2021: The rate of monochloramine decay was approximately 1 mg/L every 3.5 days (entering the tank at 2 mg/L and exiting at 1 mg/L). This corresponded with the length of time it took this tank to cycle.

Free ammonia levels during this time ranged from 0.15-0.25 mg/L.




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## Nitrification Control in a 4MG Distribution Tank (continued)

**Project Objectives:** To reduce the number and severity of nitrification events in the tank and distribution network.

**Project Considerations:** The solution must be able to monitor, dose and deliver chlorine only to bind with the existing free ammonia in the tank. This would result in the re-formation of monochloramines in the tank close to the levels originally leaving the water treatment plant.

Because this tank is in a remote location, the solution also had to be fully automated with the ability to connect to the customer's existing instrumentation and SCADA system.

**Solution:** One (1) ResidualHQ® Automated Disinfectant Control Trailer System with two (2) GridBee® GS-12 Tank Mixers.

The ResidualHQ® was customized to incorporate an existing HACH ACM 5500 monochloramine analyzer, ammonia analyzer, and tank level indicator. It was then configured to automatically calculate and deliver appropriate chlorine doses based on the tank water volume and the free ammonia levels.

**Results:** Free ammonia in tank dropped from approximately 0.15-0.25 mg/L to 0.05-0.10 mg/L, more than 50% reduction. There was no evidence of nitrification in the tank. Some nitrification was observed in the outskirts of the distribution network but overall nitrification system-wide was now significantly reduced and more manageable.

**Comments from the Consulting Engineer (2022):** "Flushing was their only tool, and it wasn't cutting it. They really needed some stronger options to prevent and combat nitrification.

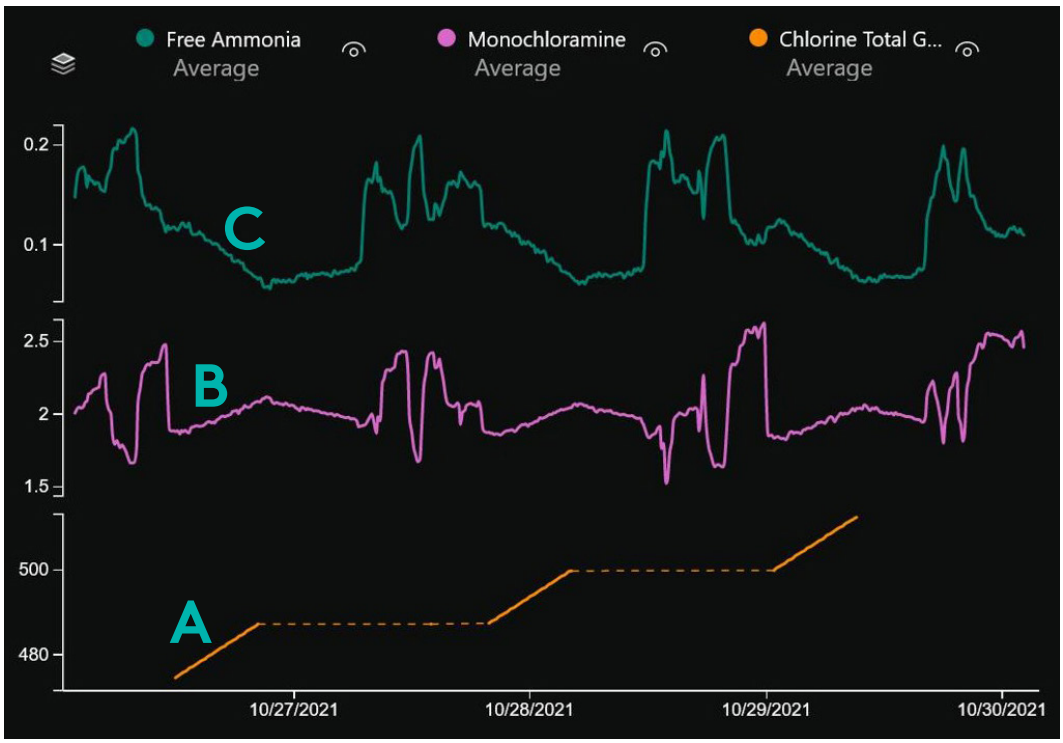
After placement of the equipment, the overall severity of nitrification was night and day. The ResidualHQ® is a very well developed and robust system. It has a lot of refined safety features and protocols. I like that it's contained on a skid making it easy to access everything you need."

Devon Smith, Underwood Engineering, Inc.

**A.** ResidualHQ® doses chlorine into the tank.

**B.** Monochloramine begins to increase.

**C.** Free Ammonia begins to decrease.





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