

ABINGTON TOWNSHIP

Automated Disinfectant Generation and Control Systems Produce Consistent Residual Levels in Aqua Pennsylvania's Distribution System



OVERVIEW

Aqua Pennsylvania (Aqua PA), an Aqua America subsidiary, serves more than 1.4 million people in 32 counties across Pennsylvania. Aqua PA has significant experience using chloramine chemistry to mitigate trihalomethane (THM) disinfection byproduct formation in its many distribution systems. As with most water utilities, this traditionally meant constant monitoring and unplanned operator callouts to adjust influential water storage tank disinfectant residual levels, particularly in the summer.

After Pennsylvania published its Disinfectant Requirements Rule (DRR) in April 2018, utilities were required in most cases to maintain a minimum chlorine residual of 0.20 mg/l at the point of use (in a home, for example). Leading up to the DRR's promulgation, Aqua PA had been considering deploying a residual control system that could automatically maintain chloramine residuals and positively influence downstream network water quality.

In 2015, the utility selected its perennially troublesome 10 million-gallon Hillside Tank in suburban Philadelphia as a demonstration site to run a Monoclor® RCS residual control system. The system was prepackaged in a trailer and included a 24/7 tank mixing system, a 40-pound-per-day on-site sodium hypochlorite generator (OSHG) as a chlorine source, an online water quality analyzer, and chemical dosing skids for ammonia and chlorine.

The Monoclor® RCS system was designed to fully mix the tank with enough energy to account for its storage volume and fill and drain cycles, determine real-time residual levels, and dose the appropriate ratio of ammonia and chlorine (constituents of monochloramine) based upon the position of the tank's residual on the chloramine breakpoint curve. The system was engaged in September 2015 and ran for a 60-day trial period.

As shown in Figure 2, the Hillside Tank began the pilot with seasonally low residuals as expected. The tank was initially taken to breakpoint to ensure an existing volume of compromised water didn't influence the test run's baseline. Within three to four days, the disinfectant residual levels stabilized at the selected 1.5 ppm (Figure 3).



Figure 1 Hillside Tank in Suburban Philadelphia

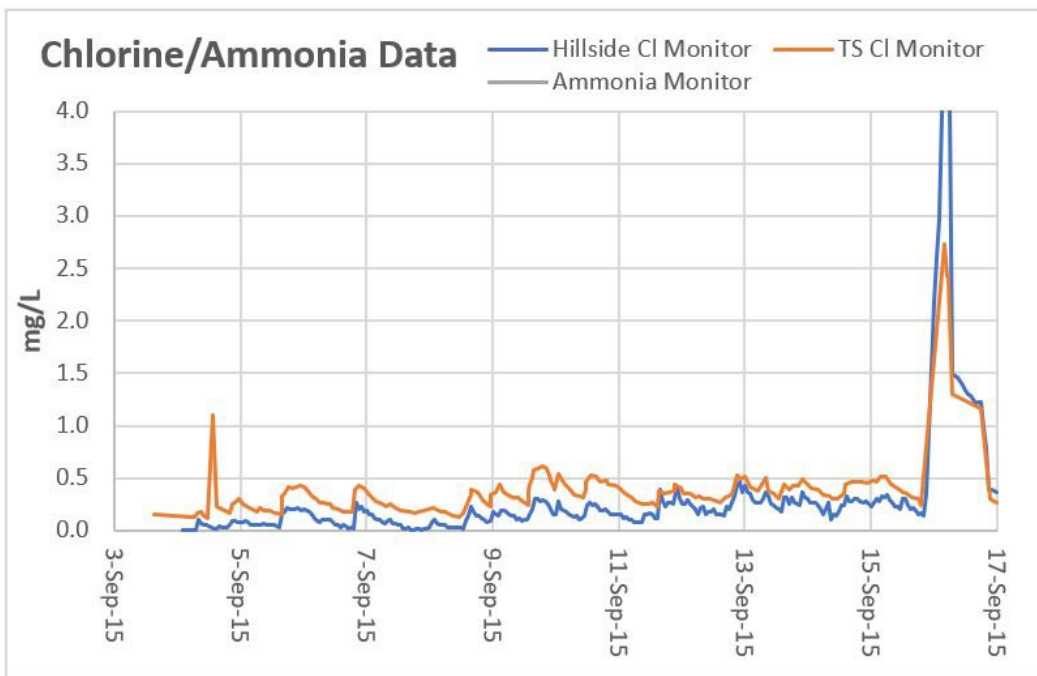


Figure 2 Hillside Tank showing seasonally low residual levels

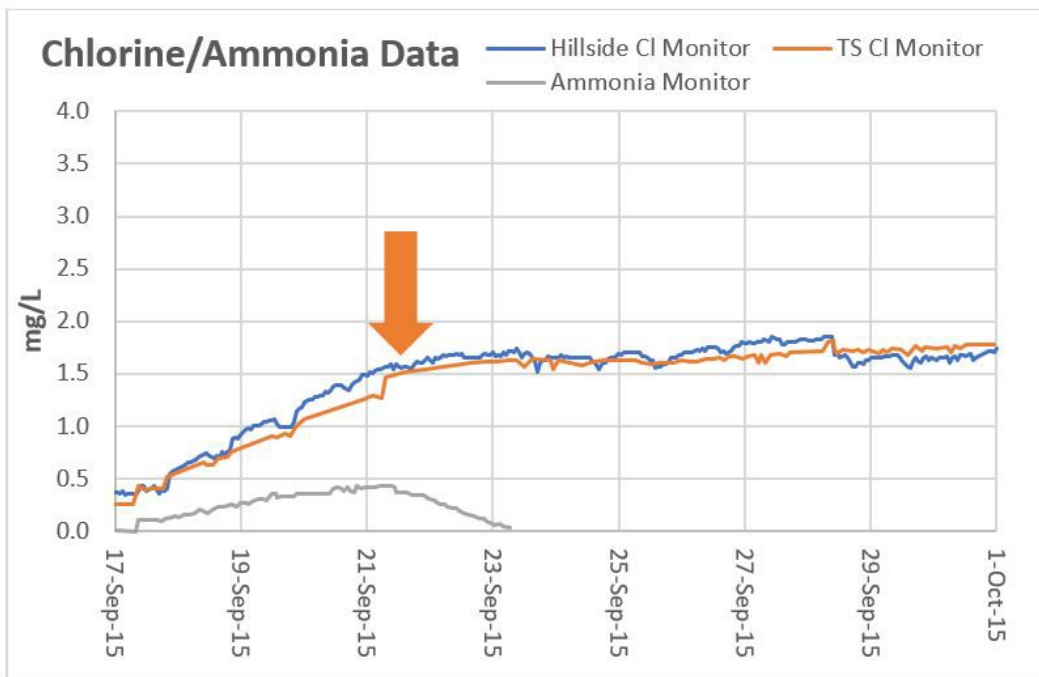


Figure 3 Hillside Tank showing stabilized residual levels at the selected 1.5 ppm

The trial was a success, and ultimately Aqua PA designed and installed a Monoclor® RCS residual control system with 100-pound-per-day Microclor® OSHG system at the Hillside Tank (Figure 4). The system maintained a consistent residual throughout the previously problematic summer months in both 2017 and 2018. In addition to successfully managing the Hillside Tank's residual, the full-scale system significantly influenced the cluster of surrounding tanks (about nine million gallons of volume) used in conjunction with Hillside to manage the system's downstream distribution network. Furthermore, the Monoclor® RCS system delivered significant economic savings by eliminating unplanned overtime and consumables used for manual tank boosting during the summer and early fall months.



Figure 4 Monoclor® RCS residual control system with 100 pound-per-day Microclor® OSHG system

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