Ultrasonic Treatment of Algae in a New Jersey Reservoir

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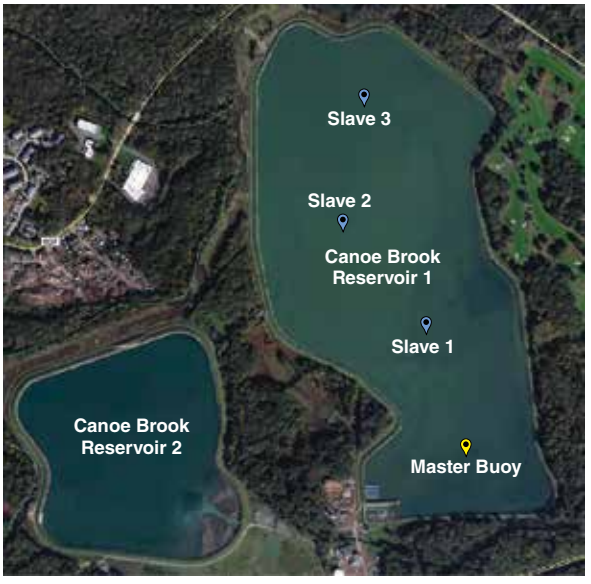
A system of ultrasonic buoys was installed in the Canoe Brook Reservoir 1 in Short Hills, N.J., to assess the impact of the system on controlling algae and cyanobacteria in the reservoir. The four buoys operated for five months in spring/summer 2014 and included one buoy with a package of water quality sensors (yellow marker in the photograph below) and three buoys without sensors (blue markers).

During the initial part of the study, the buoys seemed to control algae growth well. On August 13, an inlet from an untreated reservoir was opened because additional water was needed at the plant. This algae-laden water entered Reservoir 1 and seeded the reservoir with *Aphanizomenon*, a filamentous cyanobacterium. Almost immediately, higher levels of algae, organic carbon, and tastes and odors were detected at the plant intake. *Aphanizomenon* then bloomed in the reservoir, reaching counts of 44,000/mL. In late August, because of the bloom conditions, the ultrasonic program was adjusted to treat *Aphanizomenon*. Once the correct ultrasound program was initiated, the values for algal counts, tastes and odors, and algal pigments returned to baseline levels.



Buoy locations for Canoe Brook Reservoir 1 (N.J.). *Map data ©2014 Google*

It is clear that the plant's performance during the testing period in 2014 was better than during the same period in 2013. During the testing period, geosmin and methyl isoborneol concentrations were well-controlled (concentrations in the raw water did not exceed 5 ng/L). The improvement in raw water quality allowed the plant operations staff to reduce alum doses by more than 20% compared with 2013. These lower doses also resulted in the median dissolved air flotation effluent turbidity and median combined filter effluent turbidity being noticeably lower than in 2013; the median filter run length was nearly 20 h greater than in 2013 (reflecting an 83% improvement in unit filter run volumes). An economic assessment showed the buoys saved approximately $87,800 in operational costs, with a projected simple payback of 1.8 years for the system.

The study concluded that the buoys were effective at treating algae. The key to future success is to identify the target genus, *Aphanizomenon,* rapidly. Once the bacteria are identified in the reservoir, it is imperative to shift to the correct ultrasound program before a bloom occurs. A discussion with the buoy manufacturer indicated that the effective area of the buoys is usually decreased when the *Aphanizomenon*-specific program is used as compared with a generic-algae- or cyanobacteria-control program. Hence, the use of the *Aphanizomenon* program should be initiated only when needed, as opposed to it being the standard program.

Given the increased emphasis on harmful algal blooms, the use of ultrasonic treatment in reservoirs provides an additional tool for preventing the potential release of algal toxins into water bodies.

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