

Managing Nuisance Algae in Source Water to Improve Drinking Water Integrity

Case Study

July 2014



Figure 1: Virginia drinking water reservoir experiencing heavy cyanobacteria (*Aphanizomenon* sp. dominant) bloom in Spring 2014.

Project Overview

Location: Virginia drinking water reservoir

Virginia Reservoir: 96 surface acres, 15 feet average depth

Project Objective: Offset taste and odor compound concerns in drinking waters by addressing the source. Specifically targeting algae and cyanobacteria culprits in the reservoir (raw water).

Solution: Application of SeClear Algaecide & Water Quality Enhancer®

Results: Significant and rapid decrease in a broad-spectrum of nuisance algae, drastic decrease or maintaining of geosmin below odor threshold concentrations and long-term duration of control with less than 5 treatments needed per year.

The Problem

Taste and odor compounds are rampantly produced by numerous types of algae that are commonly present in surface waters destined for drinking. Many of these compounds are extremely difficult to treat in house, especially to achieve levels non-detectable by humans in finished water. The most efficient way to address these issues is through source control of the organisms producing the nuisance compounds. Strategic algae/cyanobacteria management in these drinking waters is extremely efficient at achieving control.

The Solution

This drinking water reservoir, among others in the area with similar management programs, had regular occurrences of nuisance taste/odor producing algae especially cyanobacteria (i.e. *Aphanizomenon*, *Oscillatoria*, *Anabaena*). To preserve integrity of source water for drinking, and to create a safe recreational system, cyanobacteria were targeted in these systems.

An Action Threshold-based approach was used to proactively address nuisance infestation prior to significantly impacting drinking water. Samples were taken weekly from near the intake at 3 different water depths. Samples were analyzed for 2-methylisoborneol (fishy) and Geosmin (dirty, musty) concentrations, subject to flavor panel review and analyzed for algae identification and density. If a notable flavor disturbance was noted, taste/odor levels exceeded a human detection threshold (10 ng/L) or potential taste/odor producing algae densities exceeded 5,000 cells/mL on average, then a targeted algaecide application was conducted to the source water. Since the nuisance algae types in this system were of diverse character, SeClear Algaecide & Water Quality Enhancer was selected based in its broad-spectrum control.

SeClear is the only US EPA registered Algaecide and Water Quality Enhancer (US EPA registration no. 67690-55; patent pending) and

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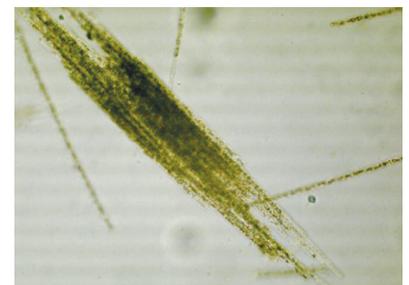
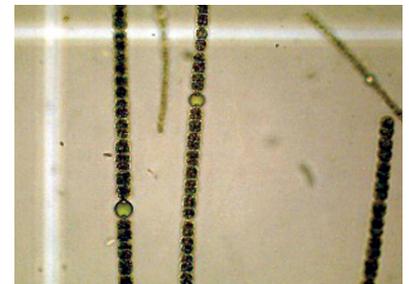


Figure 2: Photomicrographs of *Anabaena* (top) and *Aphanizomenon* (bottom) that negatively impacted drinking waters.



Figure 3: Application equipment used to target nuisance algae at different depths.

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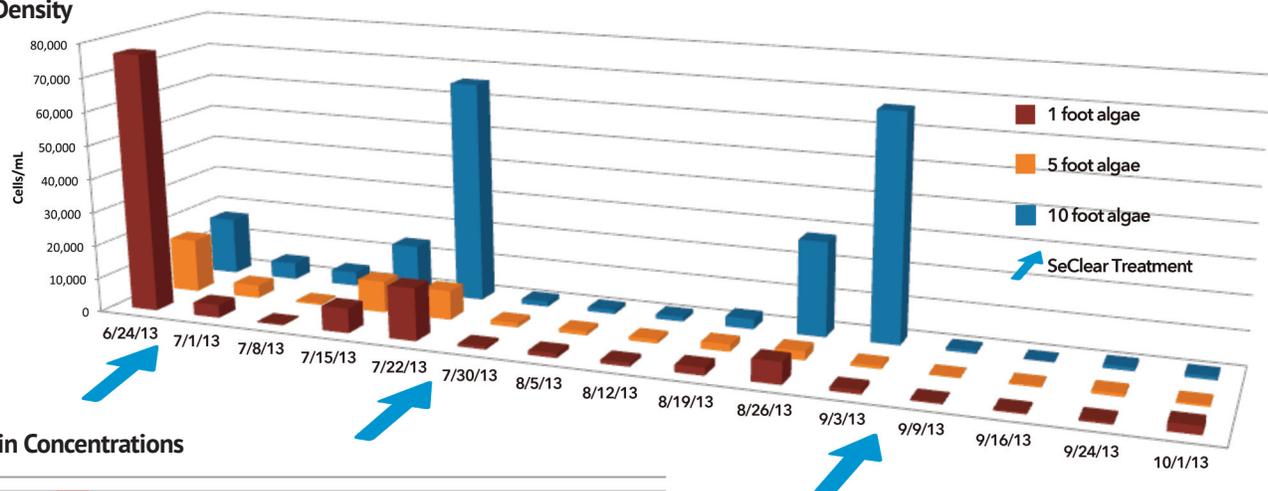
is formulated to provide both effective algaecidal activity while clarifying the water and removing key nutrients that can support rapid algae re-growth. SeClear was injected into the lake at rates based on species and corresponding depths to target measured algae cell densities. Continued monitoring was conducted to evaluate need for subsequent treatments. SeClear is NSF/ANSI Standard 60 certified for drinking waters up to the maximum approved label rate (1 mg Cu/L).



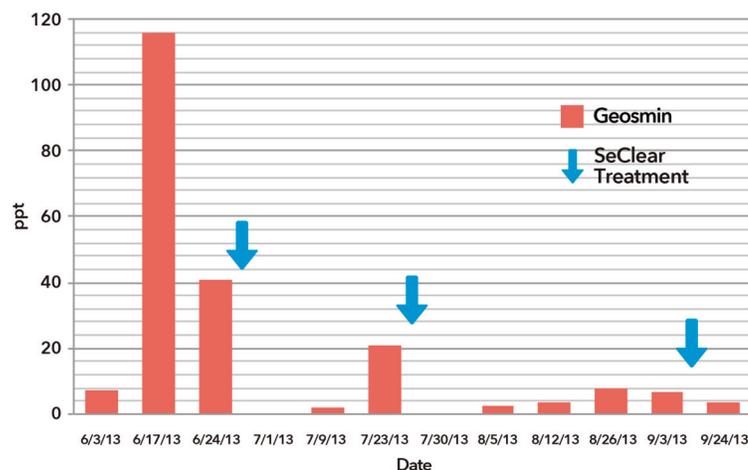
The Results

In 2013, three SeClear applications were required to maintain drinking water below designated action thresholds. Rapid and significant decreases in both total algae densities (top graph) and geosmin concentrations (bottom graph) were measured following each SeClear application (designated by blue arrows).

Algae Density



Geosmin Concentrations



Conclusion

Significant and rapid decreases in nuisance algae densities and Geosmin concentrations were measured following all SeClear treatments. Long-term control of nuisance algae was observed with usually a month between treatments. The Action Threshold-based approach was successful at preserving drinking water integrity. Minimal complaints were received from customers consuming the finished water.

SeClear provided drinking water managers an efficient approach to targeting the source of nuisance taste and odor issues to decrease reactive control measures and intensity in plant. **Better water in = Better water out.**



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