

Managing Taste and Odor in Drinking Water by Controlling the Source - Algae

Case Study

August 2014



Figure 1: Aerial image of Beaufort-Jasper source water system including the treated reservoir.

Project Overview

Location: Beaufort-Jasper, South Carolina

Water Volume: 180 Million gallon capacity, 55 surface acres

Project Objective: Address the origin of nuisance taste and odor compounds in source drinking water. Specifically, targeting the culprit algae and cyanobacteria.

Solution: Strategic application of SeClear Algaecide & Water Quality Enhancer®

Results: Rapid and sustained decrease in broad-spectrum types of nuisance algae, drastic decrease of geosmin to below odor threshold concentrations, and improved drinking water for residents.

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 effectively treat in the water treatment facility, especially to achieve levels non-detectable by humans in finished water. Beaufort-Jasper Water and Sewer Authority (BJWSA) was battling these very issues and recognized a different approach was necessary to achieve desired water quality for their customers. After evaluating all options, they felt the most efficient way to address these issues was through source control of the organisms producing the nuisance compounds.

The Solution

This drinking water reservoir, as well as connecting channels/intake zones, had regular occurrences of nuisance taste/odor producing algae especially the cyanobacteria *Pseudanabaena* and *Anabaena*. To preserve integrity of source water for drinking, cyanobacteria were targeted in these systems. An Action Threshold based approach was used to proactively address nuisance infestation prior to significantly impacting drinking water quality. Samples were taken approximately weekly from multiple locations throughout the drinking water system (channel, reservoir, intakes, etc.) and analyzed for algae types and densities through SeSCRIPT® analysis conducted at the SePRO Research & Technology Campus laboratory (IEC/ISO 17025:2005 accredited). Raw water samples were additionally analyzed for geosmin (dirty, musty flavor/odor) concentrations by another laboratory.

If monitoring detected that an Action Threshold level had been exceeded by either; 1) taste/odor compounds exceeding a human detection threshold (10 ng/L) or 2) potential taste/odor producing algae densities exceeding 5,000 cells/mL, then a targeted algaecide application was conducted to the source water.

Since the nuisance algae types in this system were widely distributed through the system and diverse water flow dynamics were present, SeClear Algaecide & Water Quality Enhancer was selected to

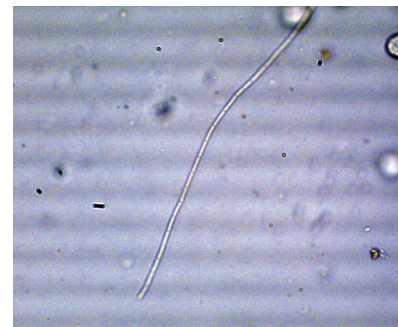
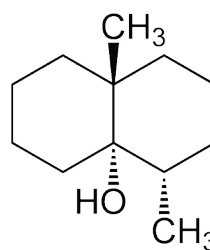


Figure 2: Pictures of the nuisance algae (*Anabaena* top, *Pseudanabaena* bottom) and culprit taste/odor compound structure (geosmin)

(Continued on back)

Managing Taste and Odor in Drinking Water by Controlling the Source - Algae

Case Study

August 2014

achieve control. SeClear is the only all in one US EPA registered Algaecide and Water Quality Enhancer (US EPA registration number 67690-55; patent pending) and 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 surface sprayed or injected at corresponding depths and sampling sites to target measured algae cell densities. Ongoing water quality monitoring was conducted to evaluate need for subsequent treatments.

The Results

In 2014, two SeClear applications (through August) were required to maintain drinking water below designated action thresholds. Rapid and significant decreases geosmin concentrations (*Figure 3.*) and algae densities (*Figure 4.*) were measured following each SeClear application (designated by blue arrows).

A SeClear treatment in late May 2014 decreased total algae densities by 98.5% and Geosmin by >99% at 3 days after treatment (DAT) in the main reservoir (*Figures 3 & 4.*). An additional SeClear treatment in late July was needed to address resurgence of nuisance algae. Results were consistent with a 95.8% average decrease in total algae and 99.1% average decrease in geosmin levels throughout the main source water reservoir.

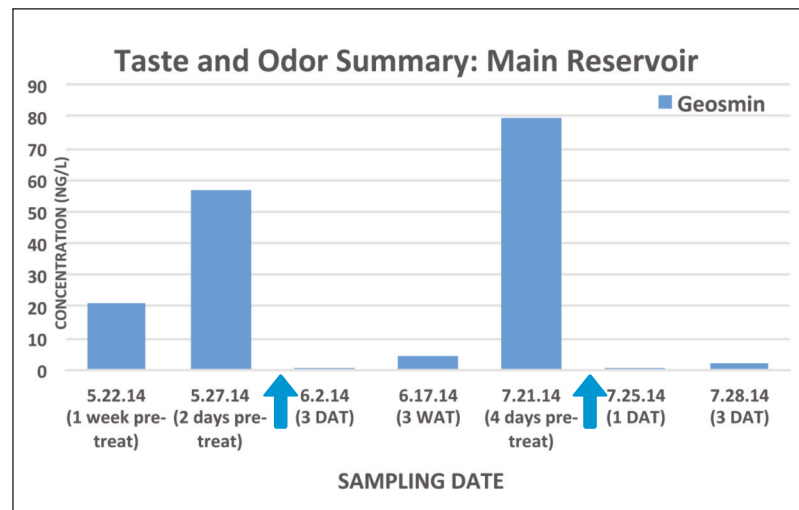
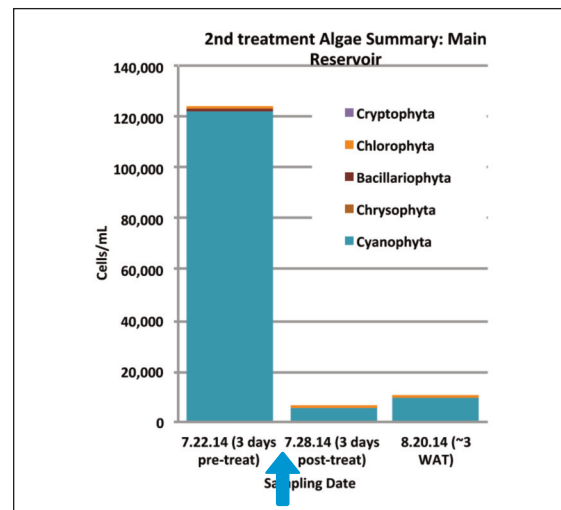
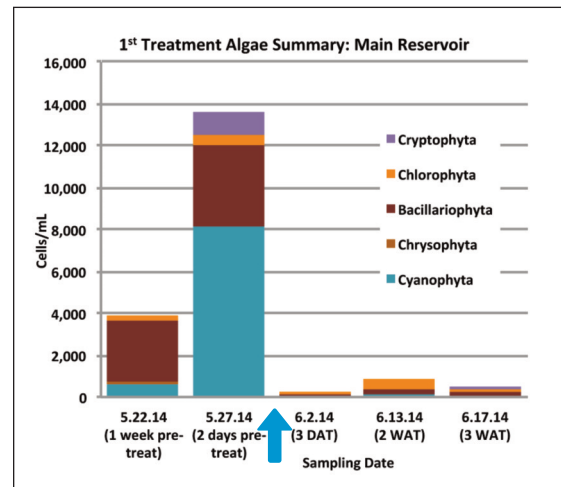


Figure 3. Geosmin concentration in the reservoir prior to and following two SeClear treatments in 2014.

Figure 4. Algae types and densities in the water supply reservoir prior to and following both SeClear treatments in 2014.

Conclusion

Significant and rapid decreases in nuisance algae densities and concomitant Geosmin concentrations were measured following all SeClear treatments. Long-term control of nuisance algae was observed with over a month between the two treatments. The action threshold based approach was successful at preserving drinking water integrity as evident in data and minimal complaints were received from water customers.

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

"You will never keep up with carbon alone, must go after source in reservoir."

"In plant carbon usage ceased for 9 weeks, cost-savings in-house greatly outweighed SeClear treatment cost."

Comments from BJWSA Field Operations Manager



For more information about SePRO's Solutions and Products, contact your SePRO Aquatic Specialist or call 1-800-419-7779. Visit stewardsofwater.com

The Stewards of Water