AMERICAN WATER

WE KEEP LIFE FLOWING®

CYANOTOXINS

Providing safe and reliable water is American Water's business. We are recognized as an industry leader and work cooperatively with the U.S. Environmental Protection Agency so that implementation of existing drinking water standards and development of new regulations will produce benefits for our customers.

WHAT ARE CYANOTOXINS AND CYANOBACTERIA?

"Cyanotoxin" is a generic term for a number of toxic compounds that are naturally produced by a group of microorganisms called cyanobacteria. Cyanotoxins include microcystin, anatoxin-a, and cylindrospermopsin.

Cyanobacteria, formerly referred to as blue-green algae, are microscopic organisms found naturally in all types of water; fresh, brackish (combined salt and fresh water), and marine water. These organisms use sunlight to make their own food. Unfortunately, cyanobacteria can produce cyanotoxins which can be harmful to humans and animals.

WHAT YOU NEED TO KNOW ABOUT POTENTIALLY HARMFUL CYANOBACTERIA

Concerns can arise if the concentration of cyanotoxin compounds reaches a high enough level where the compounds can harm fish, animals or even humans. High concentrations of cyanotoxins can occur when conditions—such as an abundance of nutrients and warm water—make it easy for cyanobacteria to thrive.

When this occurs, they may form "harmful" algal blooms (HABs). Although cyanobacteria look like algae, bloom like algae, and occur naturally like algae – they are not really algae at all! Cyanobacteria produce cyanotoxins which can, if a cyanobacteria bloom is large enough, pose health risks to humans and animals. HABs can have negative impacts on the ecosystem, human and animal health, recreational activities and the economy. Ingesting water or fish that contain elevated levels of cyanotoxin may pose a risk to the nervous system, kidneys, liver and other systems in the human body.

> At American Water, we're proactively managing algae blooms and protecting our water supplies using advanced technologies. Our comprehensive plans include monitoring, analysis, treatment, and clear communication to keep our stakeholders informed and our communities safe.
>
> **Dr. Lauren Weinrich,** Director, Research and Development, American Water

WHAT ARE THE ISSUES I MAY HAVE HEARD ABOUT?

HABs have increasingly received national attention because of risks to public health and the environment. Recent events include:

- **Millstone River, NJ:** In July 2022, following a "perfect storm," a harmful algal bloom was pushed out of Carnegie Lake into the Millstone River. At this time, New Jersey was experiencing its 4th driest and 3rd warmest summer on record. Due to the lack of flow to dilute the algae, a HAB Warning was issued. This affected NJ residents by limiting their ability to enjoy recreational activities and impacting drinking water utility operations.
- **Mississippi River:** In 2024, American Water identified a harmful algal bloom on the Mississippi River. Microcystin was detected in the river at four of American Water Company's plants, spanning over 300 miles from Davenport, IA to East St. Louis, IL, and lasted for more than a month.

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American Water's proactive monitoring played a crucial role in identifying the bloom and managing treatment to help ensure cyanotoxins were not present in the finished drinking water.

LEADERSHIP

American Water leads the water industry in several key areas related to HABs, including identifying and evaluating technologies to detect and control algal blooms, as well as technologies to remove cyanotoxins during water treatment. For example, American Water evaluated an innovative ultrasonic emmission device as an alternative to chemical control strategies for HABs in reservoirs. The research was published in the Journal of the American Water Works Association in a paper, entitled "Ultrasonic Treatment of Algae in a New Jersey Reservoir" (https://doi.org/10.5942/jawwa.2015.107.0149). The company is also researching spectral imaging as an early warning system (https://www.waterrf.org/research/projects/determining-role-spectral-imaging-early-warning-system-presencesignificance-algal).

American Water also put in place Cyanotoxin Action Plans at each of its utilities that include:

- Triggers for performing monitoring that includes source water indicators and potential system effects of HAB occurrences
- Monitoring process frameworks and decision trees for screening water samples for cyanotoxins.
- Treatment strategies that cover best available technology specific to the site, which may include one or more of the following: Algicide permits for chemical treatment of reservoirs, sonic/ultrasound units, powdered activated carbon, peroxidation, granular activated carbon filter media, biologically active filtration, and dissolved air flotation.
- Communication strategies with the state regulatory agency and public notification.

EXPERTISE & ABILITY

Our Central Laboratory, located in Belleville, IL is an EPA accredited lab with high throughput, fast turnaround time, and expanded capability for Taste and Odor compounds and Cyanotoxins.

- In-house microscopy and algal speciation capabilities.
- External collaborations for staying at the forefront of regulatory and monitoring strategies:
  - American Water staff are members of the Joint Task Group for Standard Methods section 10120 for detection and quantification of cyanobacteria using qPCR.
  - Coordination with EPA, USGS and evironmental departments monitoring studies at the state level.
  - Contracting limnologists and ecological toxicologists to understand and mitigate algae growth in our reservoirs.

LEARN MORE

EPA: https://www.epa.gov/habs/learn-about-harmful-algae-cyanobacteria-and-cyanotoxins

American Water Works Association: https://www.awwa.org/Resources-Tools/Resource-Topics/Source-Water-Protection/Cyanobacteria-Cyanotoxins

HOW AMERICAN WATER HAS CONTRIBUTED TO THE BODY OF SCIENCE ON CYANOTOXINS

American Water scientists participated in the AWWA Technical Advisory Workgroup on cyanotoxins to update the Cyanotox tool available to utilities through the AWWA website. The tool predicts the effectiveness of cyanotoxin removal by selected preoxidants.

American Water is currently leading a project, entitled "Determining the role of spectral imaging as an Early Warning System for presence/significance of algal blooms."

American Water partners with other academic and industry leaders to investigate remote sensing, monitoring and treatment techniques for HABs and Taste & Odor (T&O) events.

Missouri American Water was one of four utilities that contributed to the Water Research Foundation project "Sources and Fate of Taste and Odor Causing Compounds in the Missouri River," which was focused on gathering knowledge on the T&O-causing compounds found in four water systems on the Lower Missouri River.

The primary project deliverable is an early warning monitoring system that will help utilities in the region to:

- predict the potential for an algal bloom;
- prepare for T&O challenges; and
- manage operations to mitigate these challenges.

The project will also identify the necessary components of a regional communication network for watershed stakeholders to share information and data.

American Water partnered with other utilities and consulting agencies on the Water Research Foundation project entitled "Utility Responses to Cyanobacterial/Cyanotoxin Events; Case Studies and Lessons Learned." This project provided much needed information to effectively manage HABs and cyanotoxin events by establishing streamlined recommendations for monitoring, treatment and communications between water utilities, customers and other stakeholders (e.g., public health and regulatory agencies).