U.S. EPA's Support Tools for Managing the Risks of Cyanotoxins in Drinking Water

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EPA Region 9 Harmful Algal Bloom Workshop
April 27, 2017

Presentation Overview

- Overview of harmful algal blooms (HABs) and drinking water impacts
- EPA's recent and ongoing HAB-related activities in drinking water
- Discussion of key support tools for managing cyanotoxin risks in drinking water

Harmful Algal Blooms

- Naturally occurring cyanobacteria in surface water can rapidly form HABs
- Leading factors causing HABs:
  - Excess nutrient loadings and concentrations
  - Slow moving surface water
  - Elevated water temperature
- Some species of cyanobacteria produce toxic compounds, called algal toxins or cyanotoxins
- Significant impacts of HABs include:
  - Adverse human health effects
  - Adverse ecosystem impacts from toxins and hypoxia
  - Drinking and recreational water quality concerns
  - Economic losses

HAB-related Drinking Water Challenges

- Drinking water quality
  - Taste and odor problems
  - Human health effects from ingesting toxins: gastroenteritis, liver and kidney damage
  - Potential development of disinfection byproducts
- Public water systems
  - Increasing operational costs
  - Additional research needed on how to prevent, predict, analyze, monitor and treat toxins
  - Developing and implementing cost effective methods to reduce HABs in source waters
  - Determining how to communicate risk to the public

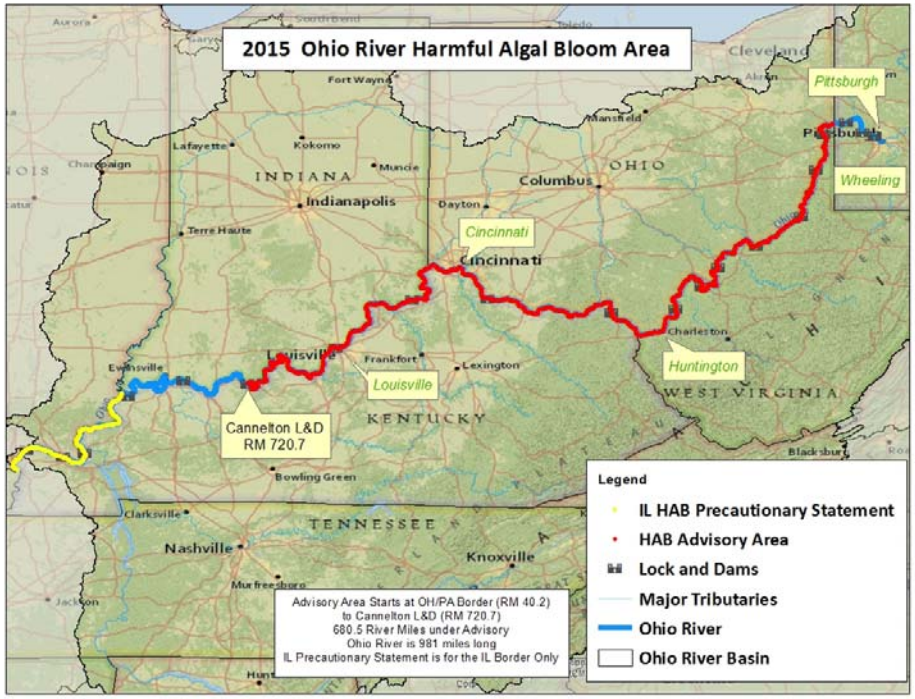
Highlights from Recent Bloom Seasons

Ohio River 2015

- Approximately 700 mile bloom
- Source of drinking water for over 5 million people

Lake Erie 2015

- Most severe bloom of this century in Lake Erie



Florida 2016

- Severe bloom impacted Lake Okeechobee, rivers, and estuaries

Utah 2016

- Severe bloom impacted Utah Lake and nearby waterbodies
- Recreational waters and secondary water systems impacted (i.e. irrigation, gardening, livestock)

Drinking Water Detects 2016

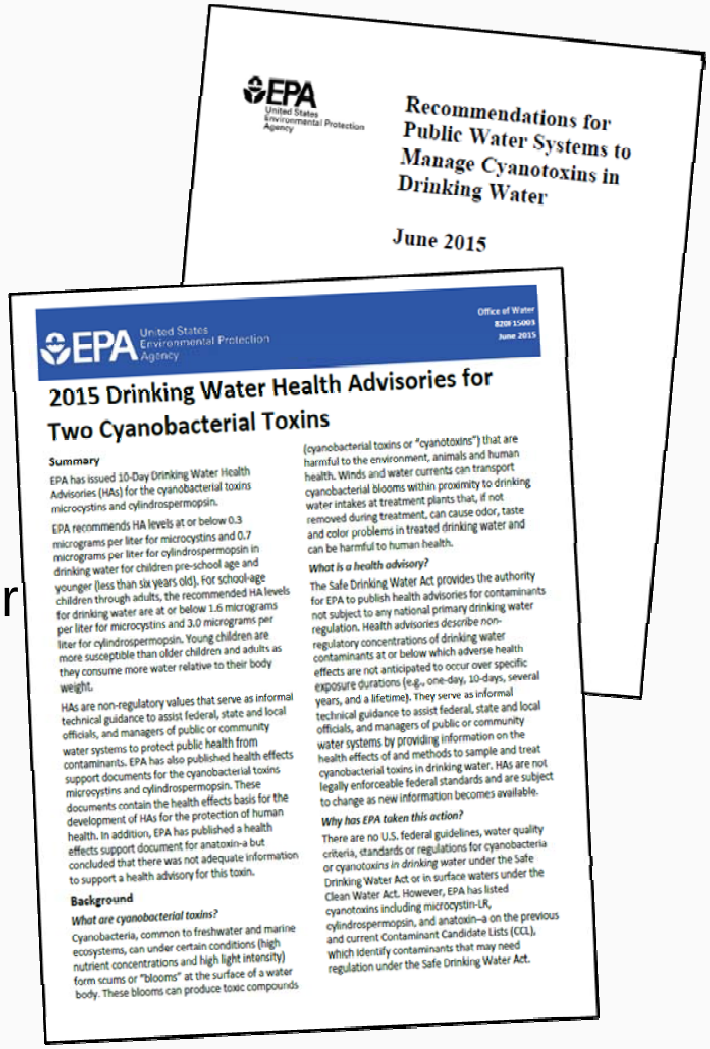
- Ingleside, Texas (Jan./Feb.)
  - Resulted in advisory
- Des Moines, Iowa (Aug.)
- Cayuga County, New York (Sept./Oct.)

Citations:

Ohio River: Ohio River Valley Water Sanitation Commission www.orsanco.org

Recent Key OW Cyanotoxin Drinking Water Activities

- Drinking water Health Advisories for two cyanotoxins – 2015
- Recommendations documents released for public water systems to manage cyanotoxins in drinking water – 2015
- "Algal Toxin Risk Assessment and Management Strategic Plan for Drinking Water", submitted to Congress – 2015
- Algal toxins placed on the Safe Drinking Water Act's Contaminant Candidate Lists (CCLs) including CCL 4 – 2016
- Cyanotoxins included in the fourth Unregulated Contaminant Monitoring Rule (UCMR 4) – 2016
- Cyanotoxin drinking water tools – 2016
- Regional HABs Workshops



EPA United States Environmental Protection Agency

Recommendations for Public Water Systems to Manage Cyanotoxins in Drinking Water

June 2015

EPA United States Environmental Protection Agency

Office of Water
820S15003
June 2015

2015 Drinking Water Health Advisories for Two Cyanobacterial Toxins

Summary

EPA has issued 10-Day Drinking Water Health Advisories (HAs) for the cyanobacterial toxins microcystins and cylindrospermopsin.

EPA recommends HA levels at or below 0.3 micrograms per liter for microcystins and 0.7 micrograms per liter for cylindrospermopsin in drinking water for children pre-school age and younger (less than six years old). For school-age children through adults, the recommended HA levels for drinking water are at or below 1.6 micrograms per liter for microcystins and 3.0 micrograms per liter for cylindrospermopsin. Young children are more susceptible than older children and adults as they consume more water relative to their body weight.

HAs are non-regulatory values that serve as informal technical guidance to assist federal, state and local officials, and managers of public or community water systems to protect public health from contaminants. EPA has also published health effects support documents for the cyanobacterial toxins microcystins and cylindrospermopsin. These documents contain the health effects basis for the development of HAs for the protection of human health. In addition, EPA has published a health effects support document for anatoxin-a but concluded that there was not adequate information to support a health advisory for this toxin.

Background

What are cyanobacterial toxins?

Cyanobacteria, common to freshwater and marine ecosystems, can under certain conditions (high nutrient concentrations and high light intensity) form scums or "blooms" at the surface of a water body. These blooms can produce toxic compounds (cyanobacterial toxins or "cyanotoxins") that are harmful to the environment, animals and human health. Winds and water currents can transport cyanobacterial blooms within proximity to drinking water intakes at treatment plants that, if not removed during treatment, can cause odor, taste and color problems in treated drinking water and can be harmful to human health.

What is a health advisory?

The Safe Drinking Water Act provides the authority for EPA to publish health advisories for contaminants not subject to any national primary drinking water regulation. Health advisories describe non-regulatory concentrations of drinking water contaminants at or below which adverse health effects are not anticipated to occur over specific exposure durations (e.g., one-day, 10-days, several years, and a lifetime). They serve as informal technical guidance to assist federal, state and local officials, and managers of public or community water systems by providing information on the health effects of and methods to sample and treat cyanobacterial toxins in drinking water. HAs are not legally enforceable federal standards and are subject to change as new information becomes available.

Why has EPA taken this action?

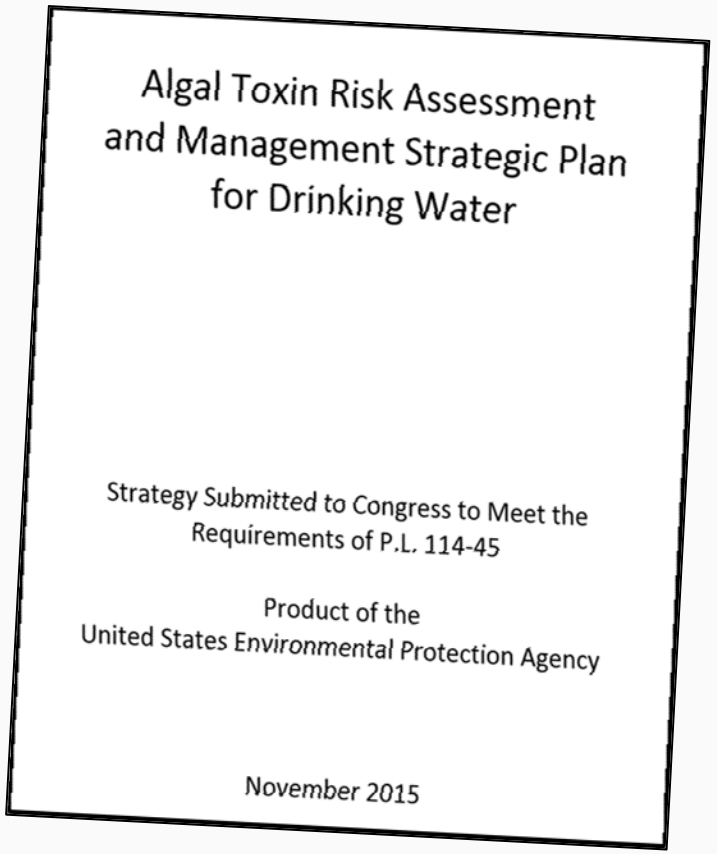
There are no U.S. federal guidelines, water quality criteria, standards or regulations for cyanobacteria or cyanotoxins in drinking water under the Safe Drinking Water Act or in surface waters under the Clean Water Act. However, EPA has listed cyanotoxins including microcystin-LR, cylindrospermopsin, and anatoxin-a on the previous and current Contaminant Candidate Lists (CCL), which identify contaminants that may need regulation under the Safe Drinking Water Act.

H.R. 212: The Drinking Water Protection Act

- The 2015 Drinking Water Protection Act amended the SDWA, adding Section 1459
- Directed EPA to develop and submit a strategic plan for assessing and managing risks associated with algal toxins in drinking water provided by public water systems
- Plan delivered to Congress November 2015

Algal Toxin Risk Assessment and Management Strategic Plan for Drinking Water

- Includes steps and timelines for:
  - Assessing human health effects
  - Developing list of algal toxins of concern
  - Publishing Health Advisories
  - Assessing treatment options
  - Developing analytical and monitoring approaches
  - Summarizing the causes of HABs
  - Recommending source water protection actions
  - Strengthening collaboration and outreach


Algal Toxin Risk Assessment and Management Strategic Plan for Drinking Water

Strategy Submitted to Congress to Meet the Requirements of P.L. 114-45

Product of the United States Environmental Protection Agency

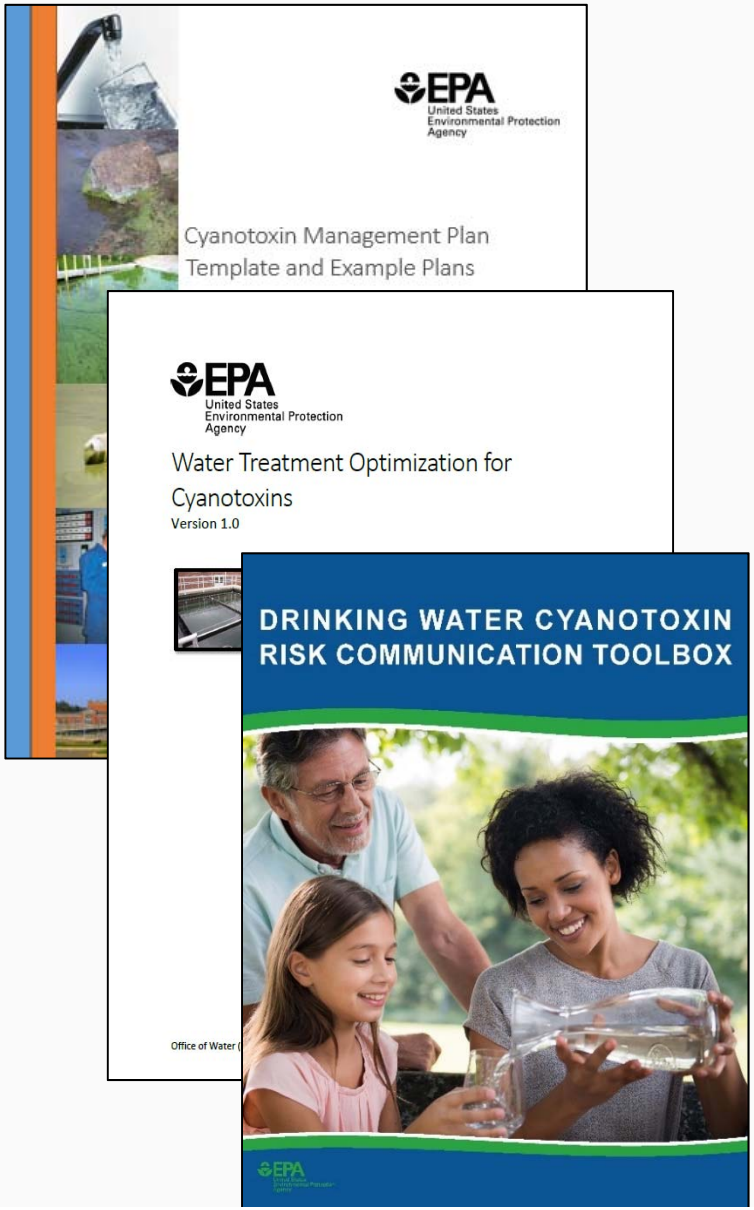
November 2015

Stakeholder Input

- April 29th, 2016 Public Meeting: Updates and feedback on drinking water and cyanotoxin activities
- Around 180 people attended (mostly via webinar)
- Remaining needs identified by stakeholders:
    - Better understanding of risk communication
    - Predictive tools
    - Treatment and mitigation strategies
    - Monitoring and methods
    - Management strategies

Recent EPA OW HAB-related Drinking Water Activities

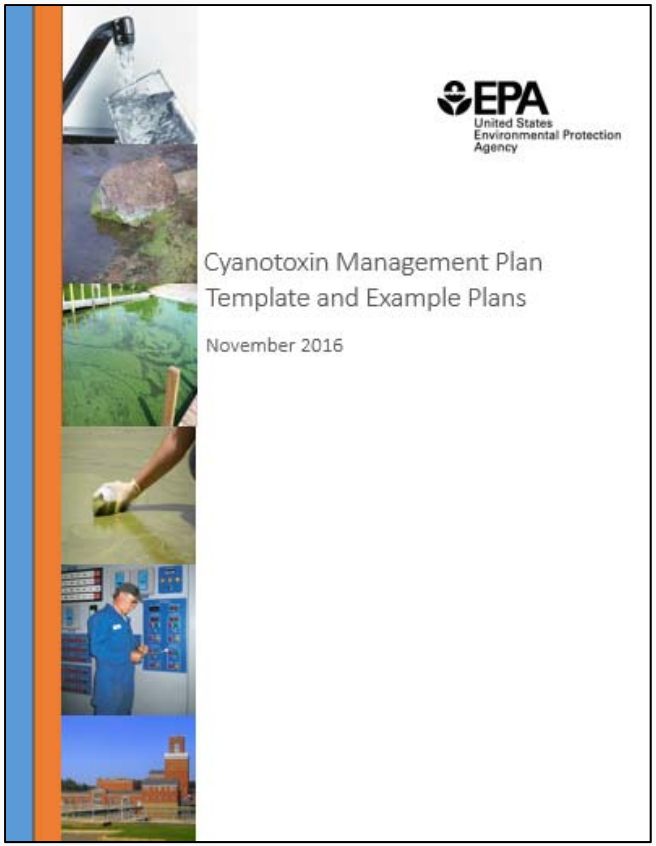
- Cyanotoxins Management Plan Template and Example Plans
- Water Treatment Optimization for Cyanotoxins
- Cyanotoxin Risk Communication Toolbox
- HABs funding factsheet
- Method development
- Promoting CWA/SDWA integration and source water protection
- Source Water Collaborative and partnerships



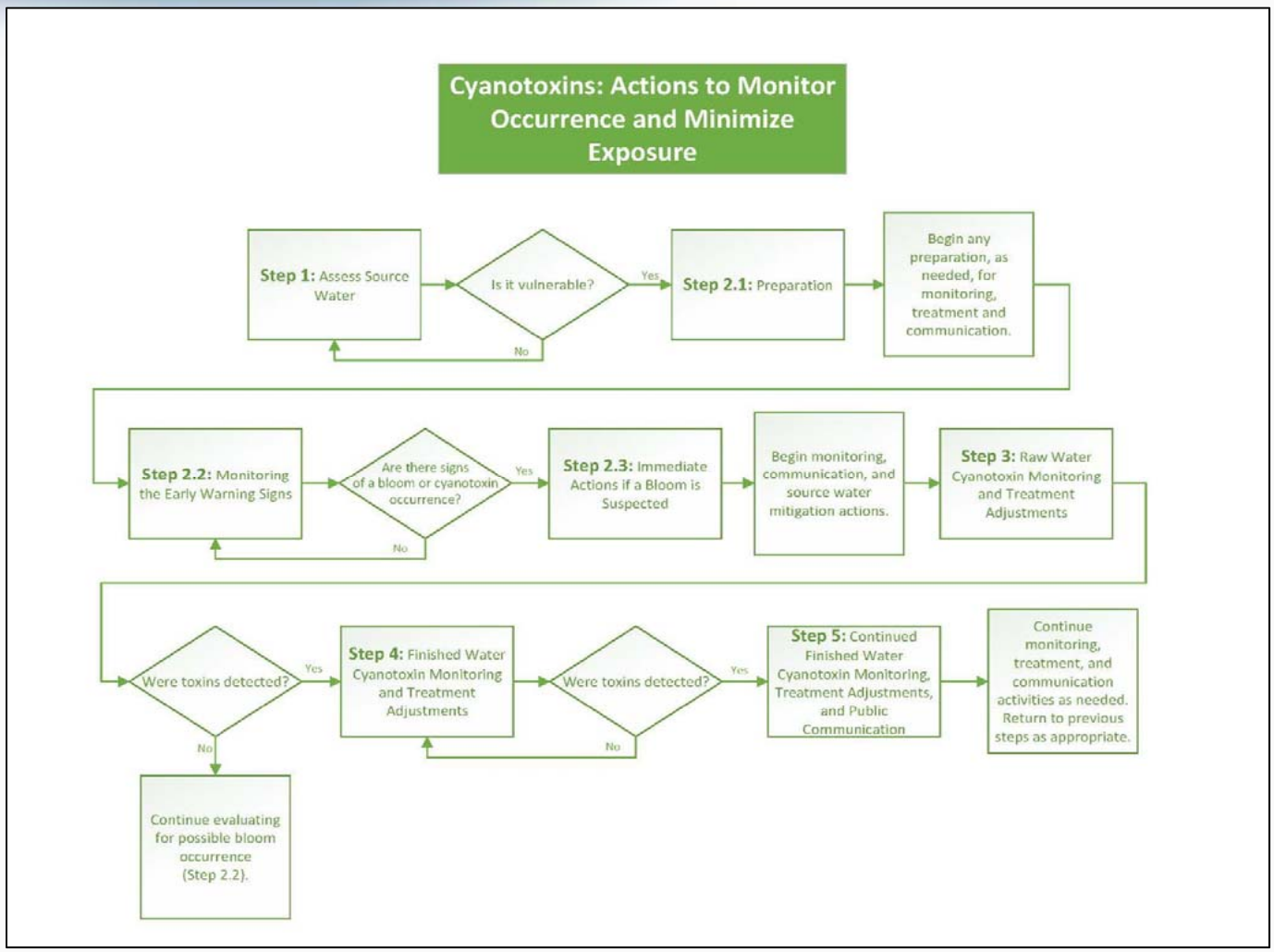
Cyanotoxin Management Plans

Two parts:

1. Template
   - Framework for public water systems (PWSs) to inform the development of their own cyanotoxin management plans as they deem appropriate
2. Five example cyanotoxin management plans
   - Examples from five partner PWSs representing diversity in system characteristics and geography

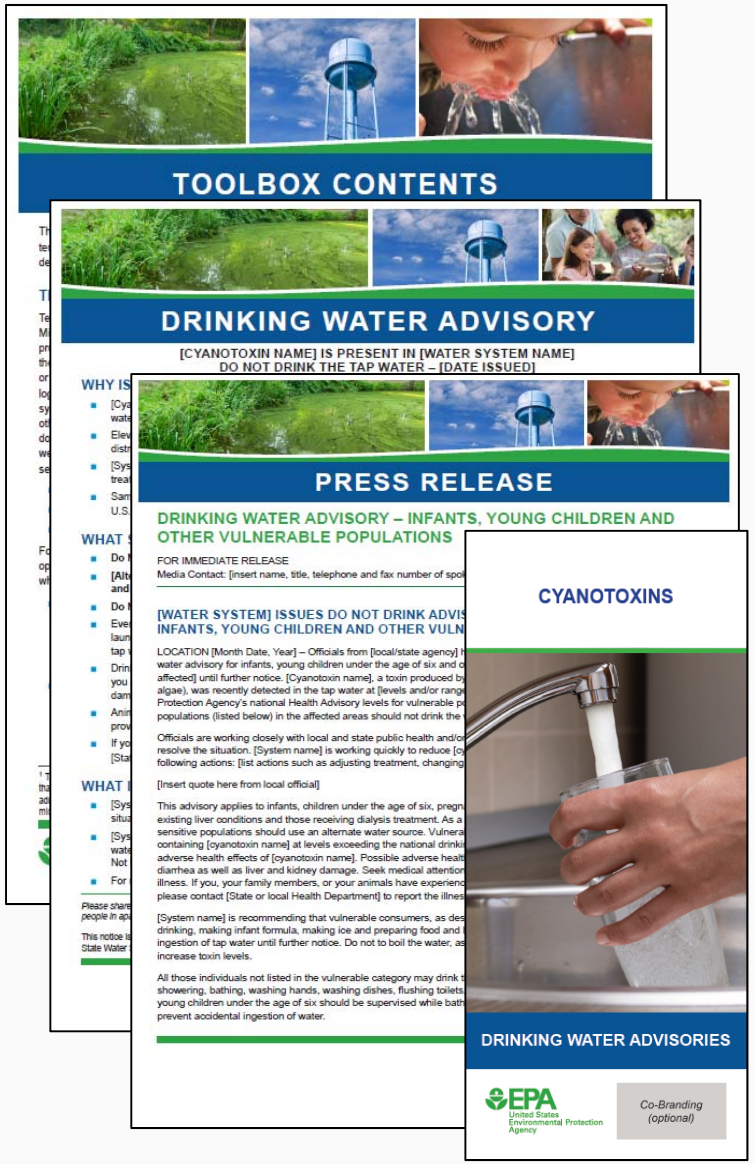


Cyanotoxin Management Plans: 5 Steps



Risk Communication Toolbox

- Ready-to-use, “one-stop shop” for communicating risks of cyanotoxins in drinking water
- Tools for local and state governments and PWSs
- Public is target audience



Risk Communication Toolbox Contents

Templates

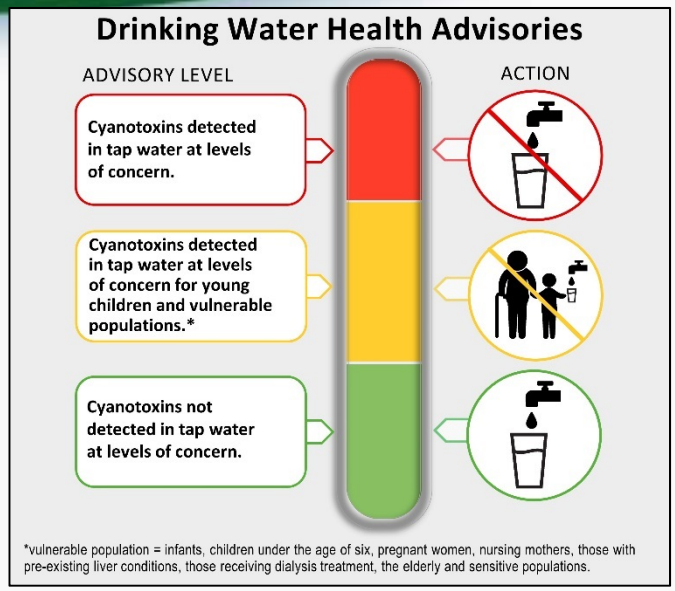
- Press releases
- Drinking Water Advisories
- Social media and text alerts

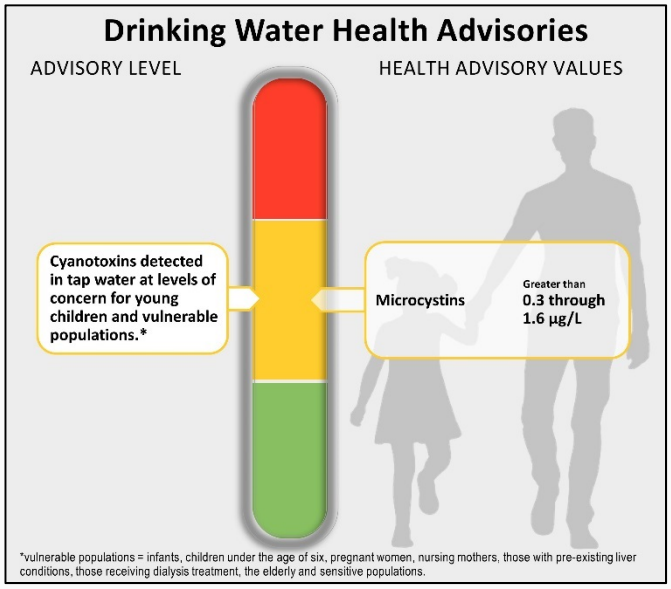
General information

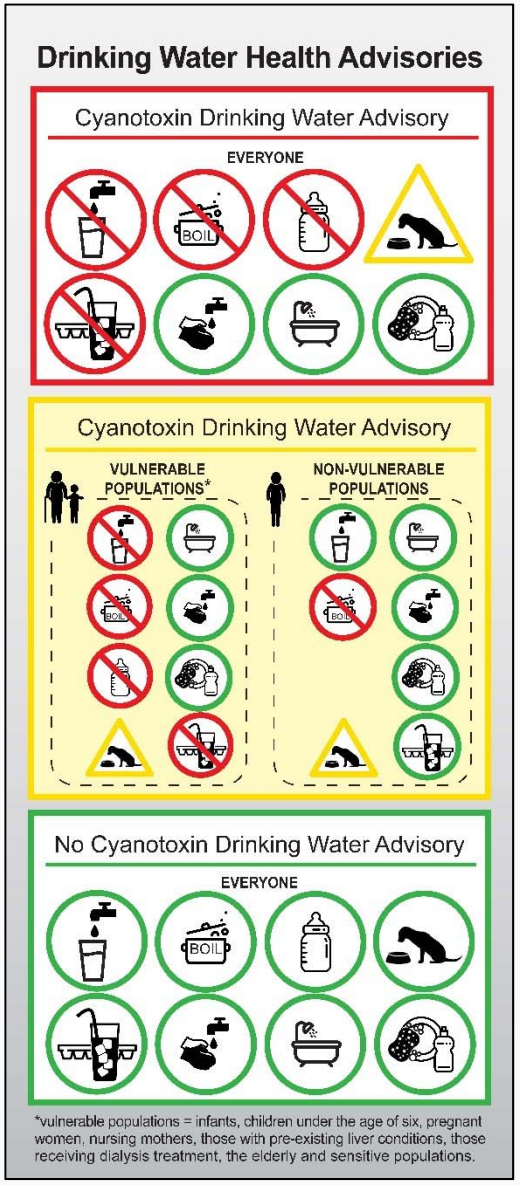
- Public messaging
- Frequently Asked Questions
- Factsheets

Graphics

- Menu of multiple downloadable options

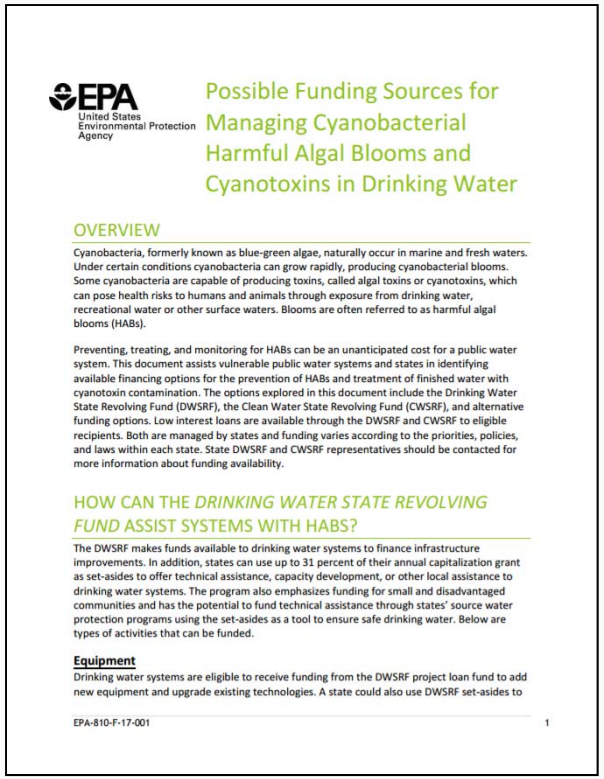






HABs Funding Fact Sheet for Drinking Water Systems

- Fact Sheet describing possible funding mechanisms to address drinking water issues associated with HABs and cyanotoxins
  - Drinking Water State Revolving Fund
  - Clean Water State Revolving Fund
  - Additional funding sources
  - State examples



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Possible Funding Sources for Managing Cyanobacterial Harmful Algal Blooms and Cyanotoxins in Drinking Water

OVERVIEW

Cyanobacteria, formerly known as blue-green algae, naturally occur in marine and fresh waters. Under certain conditions cyanobacteria can grow rapidly, producing cyanobacterial blooms. Some cyanobacteria are capable of producing toxins, called algal toxins or cyanotoxins, which can pose health risks to humans and animals through exposure from drinking water, recreational water or other surface waters. Blooms are often referred to as harmful algal blooms (HABs).

Preventing, treating, and monitoring for HABs can be an unanticipated cost for a public water system. This document assists vulnerable public water systems and states in identifying available financing options for the prevention of HABs and treatment of finished water with cyanotoxin contamination. The options explored in this document include the Drinking Water State Revolving Fund (DWSRF), the Clean Water State Revolving Fund (CWSRF), and alternative funding options. Low interest loans are available through the DWSRF and CWSRF to eligible recipients. Both are managed by states and funding varies according to the priorities, policies, and laws within each state. State DWSRF and CWSRF representatives should be contacted for more information about funding availability.

HOW CAN THE *DRINKING WATER STATE REVOLVING FUND* ASSIST SYSTEMS WITH HABS?

The DWSRF makes funds available to drinking water systems to finance infrastructure improvements. In addition, states can use up to 31 percent of their annual capitalization grant as set-asides to offer technical assistance, capacity development, or other local assistance to drinking water systems. The program also emphasizes funding for small and disadvantaged communities and has the potential to fund technical assistance through states' source water protection programs using the set-asides as a tool to ensure safe drinking water. Below are types of activities that can be funded.

Equipment

Drinking water systems are eligible to receive funding from the DWSRF project loan fund to add new equipment and upgrade existing technologies. A state could also use DWSRF set-asides to

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Ongoing EPA HAB Research Activities

- Developing innovative cyanotoxin treatment optimization, analytical methods and monitoring designs
- Correlating HABs with changes in the formation potential of regulated disinfection byproducts
- Comparing toxicity of bloom extracts with toxicity of mixtures of pure toxins
- Characterizing microcystin health effects through epidemiology studies
- Developing predictive models/satellite imaging
  - Cyanobacteria Assessment Network (CyAN)
  - EPA, USGS, NOAA, NASA collaboration
- Investigating interactive effects of temperature and nutrient loadings on HAB formation
- Evaluating the effectiveness of cost-effective source water protection measures for reducing nutrient pollution and other drivers of HAB formation

EPA's Goals for Managing Risks of HABs in Drinking Water

- **Improving scientific understanding** of HABs and cyanotoxin production to better predict their occurrence;
- **Protecting human health** by identifying human health effects of current and emerging cyanotoxins;
- **Providing necessary technical assistance** to utilities so they can provide safe drinking water through effective HABs and cyanotoxin treatment in finished water;
- **Preventing HAB formation** with effective source water protection efforts and nutrient reduction strategies at the watershed scale.

Contact Information

Contacts

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CyanoHABs website:
https://www.epa.gov/cyanohabs

Cyanotoxins in Drinking Water website:
https://www.epa.gov/ground-water-and-drinking-water/cyanotoxins-drinking-water