United States Environmental Protection Agency

US EPA Cyanotoxins Preparedness and Response Toolkit

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Office of Science and Technology
Office of Water

Next

Disclaimer

The EPA Cyanotoxins Preparedness and Response Toolkit (CPRT) is neither intended to serve as a regulatory guidance nor serve as a substitute for required regulatory practices. Links to external websites provided in this draft document may be useful and are being provided consistent with the intended purpose of this document. The EPA does not attest to the accuracy of information provided by these links. Providing links to a non-EPA Web site does not constitute an endorsement by the EPA or any of its employees of the sponsors of the site or the information or products presented on the site.

Combate Beach, Boqueron Bay, Cabo Rojo, Puerto Rico.

Who is the intended audience for the CPRT?

The Cyanotoxins Preparedness and Response Toolkit (CPRT) is primarily developed to assist states and tribes with the tools to mitigate and respond to cyanoHAB and cyanotoxin events in surface waters and drinking water systems.

Harmful algal blooms (HABs) are defined as the excessive growth of certain types of algae, with or without toxin production, affecting aquatic ecosystems, causing harm to human and animals, and impacting local economies. HABs produced by cyanobacteria, sometimes referred to as blue-green algae, able to produce toxins (cyanotoxins), are known as cyanobacterial HABs (cyanoHABs). For the purpose of this toolkit, the terms HABs, cyanotoxins and cyanoHABs are used to refer to the occurrence of cyanobacteria and/or cyanotoxins in finished drinking water and/or recreational waters at levels over the EPA's recommended values or States established guideline values.

Harmful Algal Bloom in Oneida Lake, Oswego County, New York

What does CPRT cover?

The CPRT is intended to provide an overview of the recommended preparedness actions states and tribes could take before a bloom event, and the response processes during cyanotoxin events[1] in drinking and recreational waters. This toolkit does not cover long-term management actions or the control and mitigation of HABs. Information presented in the CPRT includes:

- Template for states and tribes to develop their own Cyanobacteria/Cyanotoxin Management Plan (CMP), including worksheets and checklists to assist before and during the event;
- Frequently Asked Questions on HABs, drinking water health advisories and the Recommended Recreational Water Quality Criteria or Swimming Advisories for Microcystins and Cylindrospermopsin;
- Rules and regulations related to HABs and cyanotoxins;
- Information regarding state and tribal resources, cyanotoxin guidelines and advisory values for cyanotoxins;
- Links to key EPA and non-EPA tools relevant to the development of management plans and effective risk communication during cyanotoxin events;
- HABs incident response questionnaire states and tribes could use once a cyanotoxins event is suspected or confirmed; and
- A post HABs incident technical support questionnaire for the states and tribes to evaluate the response during and after the event.

The questionnaire, worksheets, and checklists will open in WORD documents to be completed electronically, save and/or share.

[1] Events (incidents) are defined as the occurrence of cyanobacterial cells in surface water and/or cyanotoxins in surface and finished drinking water at levels over the EPA recommended values or State established guideline values, or levels causing adverse aquatic effects. For toxins with no guideline values, the presence of toxins in surface and/or finished water is defined as an event.

Actions prior to a harmful algal bloom or cyanotoxin event

States and tribes can be greatly affected by cyanobacterial blooms in surface waters used for recreation and as a source of drinking water. Initiating communications between states, tribes and other stakeholders prior to a HABs event will ensure a quick and effective response. Before a HABs event, it is recommended that states and tribes compile information accessible on resources, tools, and personnel in order to coordinate effective technical assistance and communication with the appropriate public health response partners, including EPA staff, during the cyanotoxin event. Each organization's role and contact information should be clearly outlined and updated regularly. The contact information should include names, titles, addresses, and all applicable phone numbers, as well as a secondary contact in case the primary contact cannot be reached.

State, local, tribes, and federal response parties could include:

- EPA staff from the Regions, Program Offices and the Office of Research and Development;
- Public health and environmental agencies;
- Recreational water managers;
- Drinking water utilities;
- Monitoring and laboratory personnel;
- Other local, state and federal agencies.

✓ **Click the box on the right to access a contact list template to help a initially respond to a cyanobacterial bloom.**

Cyanobacterial Bloom Response Contact List

Actions prior to a Cyanotoxins event in drinking water systems and recreational waters

When assisting during a suspected or confirmed cyanotoxin event, states and tribes should be prepared to conduct a proper and timely assessment of the incident to make sure the appropriate technical assistance is provided. It is therefore essential to have available a list of important questions to guide a better response to the cyanotoxin incident. Possible topics include:

- Existing guideline values for cyanotoxins and any response plans currently in place
- Water quality observations, sampling methods and laboratory analyses performed, access to sampling results;
- For events affecting drinking water systems, location of intakes, types of
  treatments in place, and any additional drinking water sources available;
- Any reported animal or human health impacts from exposure to blooms and/or cyanotoxins; and
- Risk communication guidelines in place.

✓ **Cyanotoxins Incident Report Questionnaire that can be used as a guide to conduct the initial assessment could be found in the box on the right.**

Resources to prepare for a cyanotoxins event

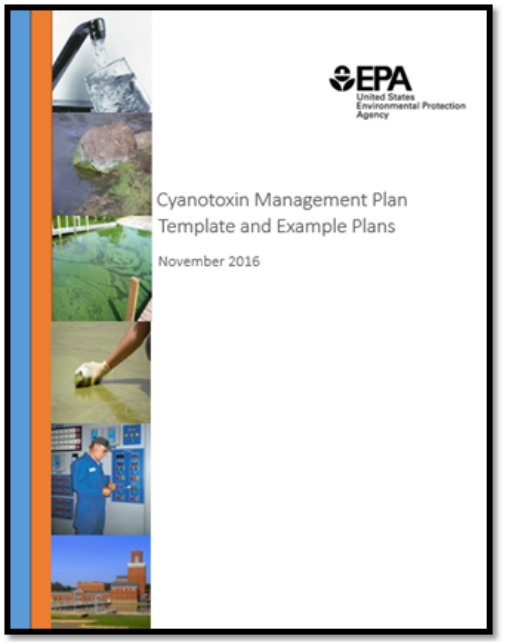
- *Cyanotoxin Management Plan Template and Example Plans*
- *Drinking Water Cyanotoxin Risk Communication Toolbox*
- *Tools for Addressing the Risks of Cyanotoxins in Drinking Water Video*
- *Incident Action Checklist - Harmful Algal Blooms*
- *Water Treatment Optimization for Cyanotoxins*
- *Drinking Water Advisories for the Cyanotoxins Cylindrospermopsin*
- *Drinking Water Health Advisories for the Cyanotoxin Microcystins*
- *Recommendations for Public Water Systems to Manage Cyanotoxins in Drinking Water*
- *Drinking Water Utility Emergency Response Plan*
- *Water Utility Communication During Emergency Response*

Cyanotoxins Incident Response Questionnaire

Cyanotoxin Management Plan

Drinking water systems as well as recreational water managers with source waters that are susceptible to HABs can benefit from developing a location-specific Cyanotoxin Management Plan (CMP) prior to a HAB event. CMPs should be periodically evaluated and modified as understanding of the specific challenges related to HABs and other important factors (i.e., personnel changes) evolve. A CMP should include steps to determine if a surface water is vulnerable to cyanotoxins, activities to be completed before an incident, related monitoring plan, control and treatment methods, and effective risk communication strategies.

The Cyanotoxin Management Plan Template and Example Plans provide a framework for states, tribes and drinking water systems to develop their own system-specific cyanotoxin management plan. EPA partnered with five utilities to develop system-specific cyanotoxin management plans that provide examples of how water systems are managing cyanotoxin risks.



✓ **To access the Cyanotoxin Management Plan Template and Example Plan click the box on the right.**

Cyanotoxin Management Plan Template and Example Plans

Waterbody Vulnerability Assessment

Evaluating available source water quality data can help determine if the waterbody is susceptible to cyanotoxins. Water managers and drinking water system operators can perform a source water HAB vulnerability assessment by:

- Identifying contamination sources, especially critical HAB contributors such as: excess nutrient (nitrogen and phosphorus) loadings and concentrations, slow-moving surface water, high water temperature, high intensity and duration of sunlight, water column stratification, changes in water pH, and occurrence of trace metals.
- Use a weight of evidence approach to determine if the source water is vulnerable to HABs based on the source water characteristics and HABs risk factors.

Resources for the assessment of source water vulnerability to cyanotoxins

- *Drinking Water Application to Protect Source Waters (DWMAPS)*
- *Watershed Assessment, Tracking & Environmental Results System (WATERS)*
- *National Hydrography Dataset (NHDPlus)*
- *Source Water Quality Databases*
- *Recommendations for Public Water Systems to Manage Cyanotoxins in Water(Appendix A)*
- *USGS: Field and Laboratory Guide to Freshwater Cyanobacteria Harmful Algal Blooms for Native American and Alaska Native Communities*
- *EPA's Water Pollution Search*
- *EPA's Enforcement and Compliance History Online Website*
- *Cyanotoxin Management Plan Template and Example*
- *Incident Action Checklist - Harmful Algal Blooms*
- *Video: Tools for Addressing the Risks of Cyanotoxins in Public Water Systems*

Preparation and Surveillance for HAB Events

If a source water is determined to be potentially vulnerable to HABs and cyanotoxins, water managers and drinking water system operators should be prepared for their occurrence by:

- Monitoring the source waters to determine when blooms are most likely to occur;
- Establishing and documenting sampling procedures, testing procedures and quality assurance procedures;
- Evaluating the current bloom control and management techniques;
- Preparing for treatment adjustments and ordering necessary laboratory equipment, and
- Planning for emergencies in the event alternative sources of water are needed.

HABs Advisory Maps

Maps can be a very valuable risk communication tool. ***ArcGIS Online***, a geographic information system, allows you to build an interactive map of HABs advisories, beach closures and more. To see a map of monthly current blooms see the EPA Newsletter ***here***.

Resources for monitoring, control and treatment HABs and cyanotoxins

- *EPA's Online Source Water Quality Monitoring for Water Quality Surveillance and Response Systems*
- *Recommendations for Cyanobacteria and Cyanotoxin Monitoring in Recreational Waters*
- *Recommendations for Public Water Systems to Manage Cyanotoxins in Water (Appendix A)*
- *Cyanobacteria and Cyanotoxins: Information for Drinking Water Systems Fact Sheet*
- *Water Treatment Optimization for Cyanotoxins Document*
- *AWWA and WRF's Managing Cyanotoxins in Drinking Water: A Technical Guidance Manual for Drinking Water Professionals*
- *WHO's Management of Cyanobacteria in Drinking-Water Supplies: Information for regulators and water suppliers*
- *GRC's International Guidance Manual for the Management of Toxic Cyanobacteria*
- *WHO's Guidelines for Safe Recreational Water Environments*
- *The Practical Guide to Lake Management in Massachusetts Cyanotoxin Management Plan Template and Example Plans*
- *Emergency Drinking Water Supply Guidance*

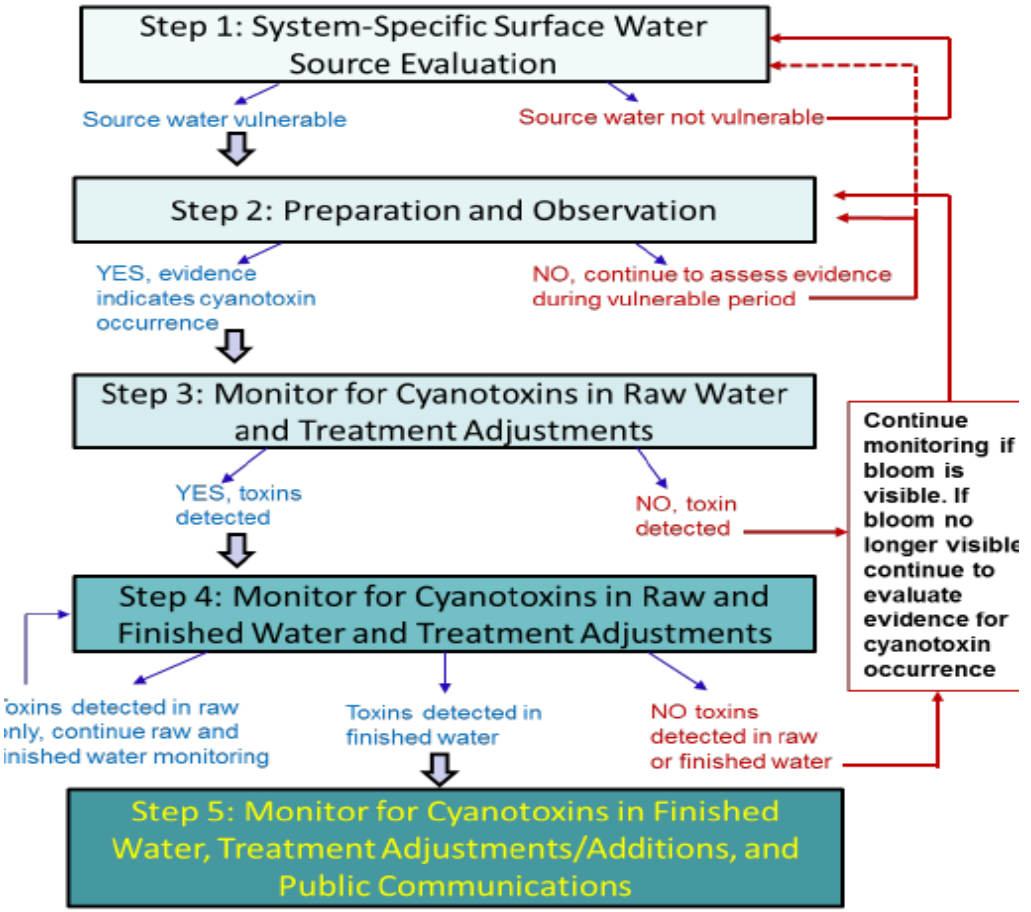
Potential Cyanotoxins Monitoring Steps in Drinking Water Systems

The EPA developed potential monitoring and management steps to assist drinking water systems to manage cyanotoxins in raw and finished drinking water.

Potential Cyanotoxins Management Steps *

- Step 1: Assess source water for HABs and prioritize recreational waters for monitoring.
- Step 2: Prepare, monitor for early warning signs and identify immediate actions.
- Step 3: Conduct cyanotoxin monitoring and perform treatment adjustments.
- Step 4: Conduct finished water cyanotoxin monitoring and treatment adjustments.
- Step 5: Continue cyanotoxins monitoring in finished water, treatment adjustments, and public communications.

*Adapted from ***EPA's Recommendations for Public Water Systems to Manage Cyanotoxins in Drinking Water***



Click here to access the diagram in the Recommendations Document

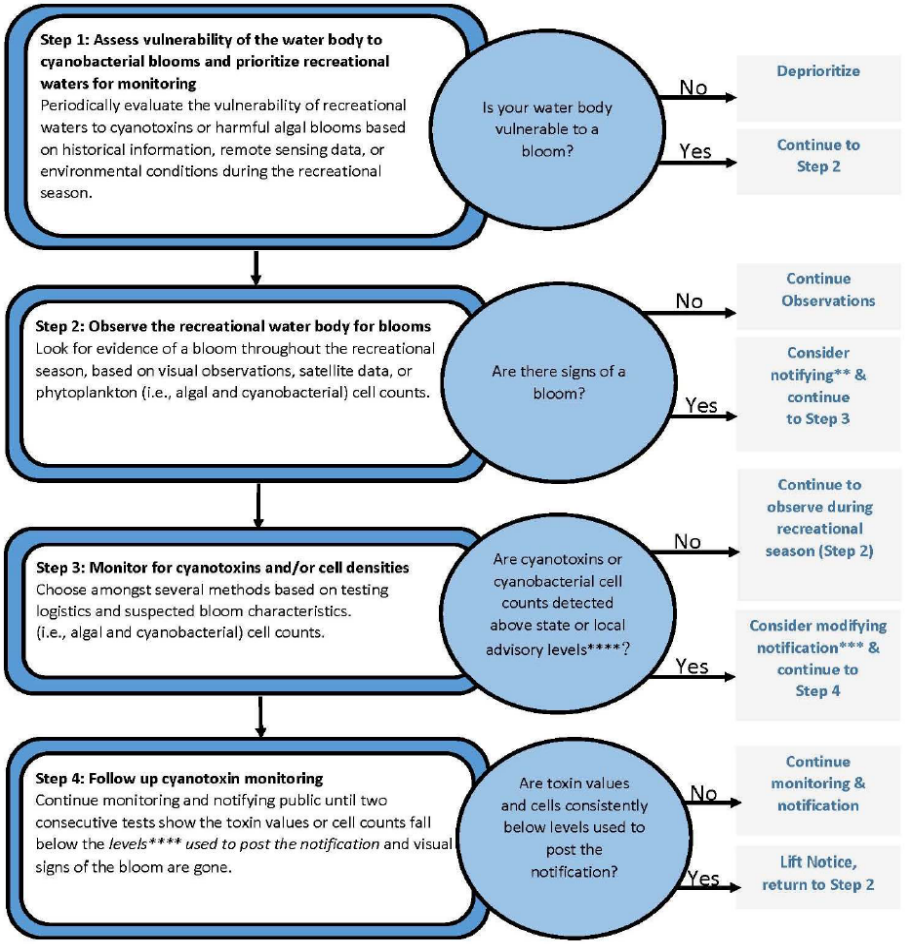
Recommended Cyanotoxins Monitoring Steps in Recreational Waters

The EPA developed a stepwise conceptual framework for monitoring for cyanotoxins in recreational waters.

Monitoring Cyanobacteria/Toxins in Recreational Waters*

- Step 1: Assess vulnerability of the water body to HABs and prioritize recreational waters for monitoring.
- Step 2: Observe recreational water body for blooms at the beginning and throughout the recreational season.
- Step 3: Monitor for cyanotoxins.
- Step 4: Follow up cyanotoxin monitoring.

*Adapted from ***Monitoring and Responding to Cyanobacteria and Cyanotoxins in Recreational Waters***



Click here to access the diagram in the Monitoring Document

EPA's Drinking Water Health Advisory Levels for Cyanotoxins

In 2015, the EPA developed **Drinking Water Health Advisories (HAs) for the cyanobacterial toxins microcystins and cylindrospermopsin** (see table below).

- HAs are non-regulatory concentrations of contaminants in drinking water at which adverse effects would not be anticipated to occur over specific durations of exposure.
- The EPA developed ten-day HAs for children and adults because of the variability on body weight and drinking water intake per age groups.
- If the HA is exceeded, consideration should be given to protect those that are particularly vulnerable such as bottle-fed infants, individuals with liver and/or kidney disease, and dialysis patients.

EPA also developed Health Effect Support Documents (HESD) for microcystins, cylindrospermopsin, as well as for anatoxin-a.

- *US EPA Health Effects Support Document for the Cyanobacterial Microcystins Toxins*
- *US EPA Health Effects Support Document for the Cyanobacterial Toxin Cylindrospermopsin*
- *US EPA Health Effects Support Document for the Cyanobacterial Toxin Anatoxin-a*

10-day Drinking Water Health Advisories			
Cyanotoxins	**Bottle-fed infants and pre-school children**	**School-age children and adults**	**Link**
Microcystins	**0.3 µg/L**	**1.6 µg/L**	**US EPA Drinking Water Health Advisory for the Cyanobacterial Microcystins Toxins**
Cylindrospermopsin	**0.7 µg/L**	**3.0 µg/L**	**US EPA Drinking Water Health Advisory for the Cyanobacterial Toxin Cylindrospermopsin**

EPA's Recommended Recreational Ambient Water Quality Criteria or Swimming Advisories for Cyanotoxins

In 2019, the EPA published **Recommended Human Health Recreational Ambient Water Quality Criteria or Swimming Advisories for Microcystins and Cylindrospermopsin.** These recommended recreational ambient water quality criteria or swimming advisories are concentrations of microcystins and cylindrospermopsin in recreational waters which are protective of human health while swimming or participating in other activities in or on the water.

EPA published these recommended criteria values under Clean Water Act Section 304(a)(1) for states, territories, and tribes to consider adopting new or revised water quality standards. Alternatively, states and tribes may consider using these same values as the basis for swimming advisories for public notification purposes in recreational waters to protect the public.

Application	Recommended Recreational/Swimming Advisory Values	
	Microcystins	Cylindrospermopsin
	8 µg/L	15 µg/L
Swimming Advisory	Not to be exceeded on any day.	
Recreational Criteria for Waterbody Assessment	A maximum of three excursions across a recreational season.	
Link	Recommended Human Health Recreational Ambient Water Quality Criteria or Swimming Advisories for Microcystins and Cylindrospermopsin	

- If the toxins concentrations are higher than the criterion magnitude in a sample collected during a ten-day assessment period (an excursion), the EPA recommends increasing the monitoring frequency to better understand the temporal and spatial nature of cyanotoxin occurrence in the affected waterbody.
- Not more than 3 excursions in more than one year across a recreational season reflects seasonal dynamics and occurrence patterns of HABs within years and the potential for adverse health effects over a short-term duration of exposure (i.e., approximately 30 days).

✓ *The EPA has developed a Technical Support Document: Implementing the 2019 National Clean Water Act Section 304(a) Recommended Human Health Recreational Ambient Water Quality Criteria or Swimming Advisories for Microcystins and Cylindrospermopsin to assist states and tribes interested in adopting the EPA's recommended recreational criteria for cyanotoxins. For more information visit the* ***EPA's Recreational Water Quality Criteria and Methods | Water Quality Criteria*** *page.*

Planning for HABs Events: Risk Communication

Planning for a HABs event also involves establishing communication plans to be prepared for any public communication as appropriate or required by the state, tribe or territory.

✓ The EPA developed tools and resources to assist water managers and drinking water systems to develop their risk communication plans. Click the appropriate box below to access these resources.

Drinking Water Cyanotoxin Communication Toolbox

Recreational Water Cyanotoxin Communication Toolbox

Getting prepared on risk communication

- *CDC's Drinking Water Advisory Communication Toolbox*
- *Recommendations for Public Water Systems to Manage Cyanotoxins in Water (Appendix D)*
- *Cyanotoxin Management Plan Template and Example Plans*
- *Water Utility Communication During Emergency Response*

The EPA recommends for states and tribes to report suspected or confirmed HABs or cyanotoxins human and animal illnesses associated with cyanobacterial blooms to the One Health Harmful Algal Bloom System (OHHABS). The Centers for Disease Control and Prevention (CDC) developed OHHABS as a voluntary reporting system available to state and tribal public health departments and their designated environmental health or animal health partners. The goal of OHHABS is to collect information to support the understanding and prevention of HABs and HAB-associated illnesses. The OHHABS can be accessed ***here.***

When communicating with the public about risk, it is important to communicate that HABs pose a significant health threats to pets. Pets and other animals can be exposed to cyanobacteria and their toxins through drinking toxin-contaminated water or by swimming in waters with a cyanoHAB. If you suspect a HAB is present in a water body, do not let your pet swim or drink the water, play or eat scum mats, and do not let your pet lick their fur after swimming in contaminated water. If your pet has come into contact with water with a HAB, rinse them with tap water as soon as possible. Seek veterinary care immediately if your pet has consumed or licked scum on its fur after swimming or playing in water that has a HAB. More information on how to protect pets go ***here***.

Actions During a Cyanotoxins Event

During a cyanotoxins event, states and tribes drinking water systems and recreational water managers should be prepared to provide information on action levels, sample collection and analysis, effective treatment options, and resources available to provide technical assistance and to communicate risks. Information that could be helpful include:

- When and where cyanotoxins have been found and what the risks are to people, pets, animals and the environment.
  - Action steps to protect your health and the health of your family and pets.
  - Options for treatment and management.
  - How to learn when and if information is updated.
- Basic information on HABs and cyanotoxins and what are the common causes.
  - Information about how HABs are likely to become more common over time due to climate change.
  - Recommended advisory values for cyanotoxins and what they mean.
  - Most common HABs and cyanotoxins in your state.
  - How you can spot signs of cyanotoxins if you are not aware of an advisory.
  - Information from initial laboratory analyses at a specific site or sites such as the toxins and their concentrations and what this means for risk.

This information can be supported by different types of risk communication materials including the resources included in this toolkit.

Resources for assistance during a cyanotoxins event

- *Cyanotoxin Management Plan Template and Example Plans*
- *Drinking Water Cyanotoxin Risk Communication Toolbox*
- *Tools for Addressing the Risks of Cyanotoxins in Drinking Water Video*
- *Incident Action Checklist - Harmful Algal Blooms*
- *Water Treatment Optimization for Cyanotoxins*
- *Drinking Water Health Advisories for the Cyanotoxins Cylindrospermopsin*
- *Drinking Water Health Advisories for the Cyanotoxin Microcystins*
- *Recommendations for Public Water Systems to Manage Cyanotoxins in Drinking Water*
- *Recommendations for Cyanobacteria and Cyanotoxin Monitoring in Recreational Waters*
- *Monitoring and responding to cyanobacteria and cyanotoxins in recreational waters*
- *Recreational Water Communication Risk Toolbox for Cyanobacterial Blooms*
- *Recommended Human Health Recreational Water Quality Criteria or Swimming Advisories for Microcystins and Cylindrospermopsin*
- *List of Laboratories analyzing for cyanobacteria and their toxins*

Actions During a Cyanotoxins Event (continued)

✓ The link below provides access to a frequently asked questions document discussing cyanobacteria and cyanotoxins as well as information regarding health effects and what are the drinking water health advisories for cyanotoxins.

Harmful Algal Blooms and Cyanotoxins FAQs

➢ *Will help you answer what are cyanobacterial HABs, what are the possible health effects from exposure to them and their toxins; what are the recommended advisory values for cyanotoxins; etc.*

✓ To improve communication during cyanotoxins events, the EPA developed a form to **track new and/or persistent cyanobacterial blooms and cyanotoxins events.** To access the template click the box below.

Template Summary of State HABs Events

Template of Bloom Reports

➢ *To record each bloom individually and to summarize the blooms season in your state; locations, dates, how, where and when the cyanotoxins were detected; and information from initial laboratory analyses such as the identification of the toxins and concentrations.*

✓ To address further questions on approaches to optimize **drinking water treatment** in case cyanotoxins are present in drinking water systems, the EPA developed the Water Treatment Optimization for Cyanotoxins Document. To access this document, click the box below.

Water Treatment Optimization for Cyanotoxins Document

➢ *Contains proactive approaches for water sampling and monitoring to help drinking water systems anticipate treatment needs and treat cyanotoxins in drinking water. Information is presented for treating cyanotoxins using many types of water treatment.*

Risk Communication During a Cyanotoxins Event

It is recommended that the states and tribes use consistent communication tools during an event. The EPA developed an infographic and ready-to-use templates to develop risk communication materials, including:

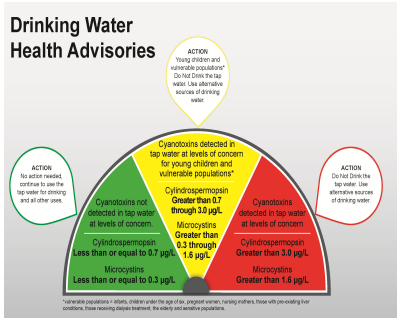
- Templates: for press releases, drinking water advisories and recreational criteria/ swimming advisories, and social media and text alerts;
- General Information: talking points and messages for consumers and recreators, frequently asked questions and factsheets;
- Graphics: downloadable options for graphics.

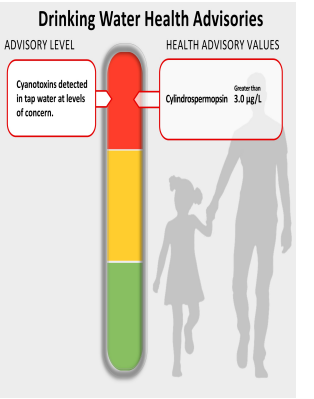
Click the appropriate box below to access these resources.

Drinking Water Cyanotoxin Communication Toolbox

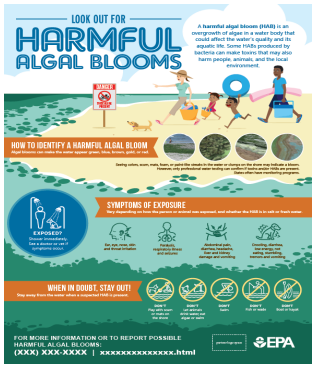
Recreational Water Cyanotoxins Communication Toolbox

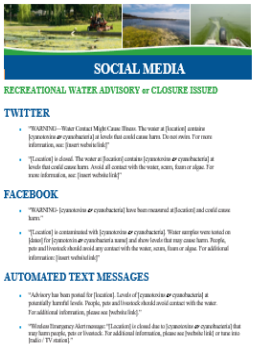
Graphics



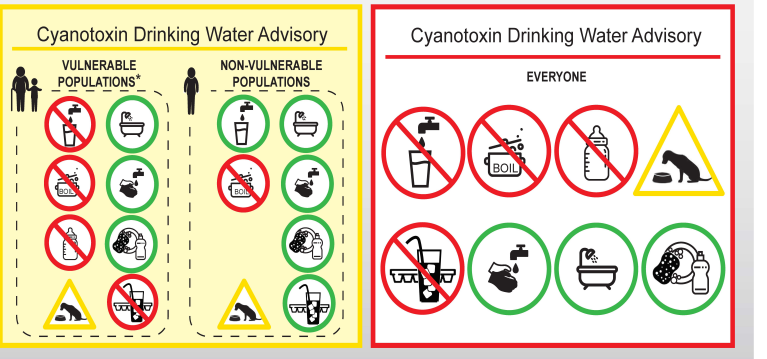


Infographic





Templates



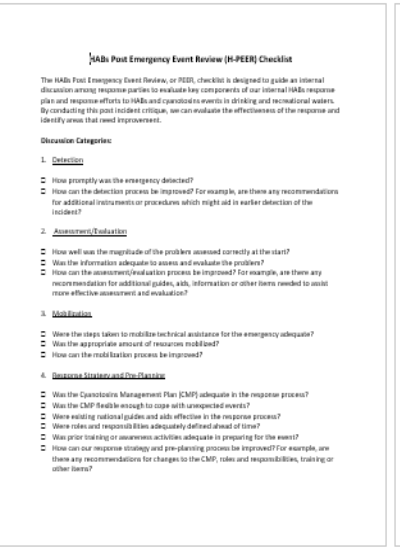
Actions After a Cyanotoxins Event

Once the HABs and cyanotoxins event is over, it is recommended for states and tribes to conduct a post-incident comprehensive assessment to identify the adequacy of the cyanotoxins incident response and assess the effectiveness of the response and the risk communication activities to improve the future responses. A part of this post-incident assessment and debrief should be to explicitly plan to incorporate insights into future event planning.

A debrief with all the involved agencies, e.g. drinking water systems and managers of recreational sites, after the incident helps to identify problems and flaws during the incident and determine areas that need improvement, as well as those actions that contributed to a successful response and that should be repeated in future cyanotoxins contamination events.

✓ **The EPA developed a HABs Post Emergency Event Review Questionnaire to be used as a guide to conduct the post-event assessment response. To access the questionnaire, click the box below.**

HABs Post Emergency Event Review Questionnaire



HABs Post Emergency Event Review (H-PEER) Checklist

The HABs Post Emergency Event Review, or PEER, checklist is designed to guide an internal discussion among response parties to evaluate key components of our internal HABs response plan and response efforts to HABs and cyanotoxins events in drinking and recreational waters. By conducting this post incident critique, we can evaluate the effectiveness of the response and identify areas that need improvement.

Discussion Categories:

1. Detection
   - ☐ How promptly was the emergency detected?
   - ☐ How can the detection process be improved? For example, are there any recommendations for additional instruments or procedures which might aid in earlier detection of the incident?
2. Assessment/Evaluation
   - ☐ How well was the magnitude of the problem assessed correctly at the start?
   - ☐ Was the information adequate to assess and evaluate the problem?
   - ☐ How can the assessment/evaluation process be improved? For example, are there any recommendation for additional guides, aids, information or other items needed to assist more effective assessment and evaluation?
3. Mobilization
   - ☐ Were the steps taken to mobilize technical assistance for the emergency adequate?
   - ☐ Was the appropriate amount of resources mobilized?
   - ☐ How can the mobilization process be improved?
4. Response Strategy and Pre-Planning
   - ☐ Was the Cyanotoxins Management Plan (CMP) adequate in the response process?
   - ☐ Was the CMP flexible enough to cope with unexpected events?
   - ☐ Were existing national guides and aids effective in the response process?
   - ☐ Were roles and responsibilities adequately defined ahead of time?
   - ☐ Was prior training or awareness activities adequate in preparing for the event?
   - ☐ How can our response strategy and pre-planning process be improved? For example, are there any recommendations for changes to the CMP, roles and responsibilities, training or other items?
5. Coordination Structure
   - ☐ Was there adequate coordination during the incident?
   - ☐ Was there adequate tracking of the incident?
   - ☐ Were communications adequate (i.e., clear, consistent, inclusive)?
   - ☐ Were the timing and length of briefings and updates adequate?
   - ☐ Were roles and responsibilities appropriately performed among the involved programs or staff?
   - ☐ How can the coordination process be improved? For example, additional procedures, identification of POCs, roles and responsibilities clarification, or other items?
6. Media/Public Relations
   - ☐ Were communications clear and consistent with the media? With the public?
   - ☐ Can communications be further streamlined via consolidated recommendations?
   - ☐ What problems were encountered? What topics were difficult to communicate and why?
   - ☐ Would it be useful to undertake a public information effort or additional materials development about particular HABs topics?
   - ☐ How can the media/public relations process be improved?

EPA Resources on Cyanotoxins

- EPA CyanoHABs Website
- EPA Managing Cyanotoxins in Public Drinking Water Systems Webpage
- Drinking Water Health Advisory for the Cyanobacterial Toxin Cylindrospermopsin
- Drinking Water Health Advisory for the Cyanobacterial Microcystins Toxins
- EPA Health Effects Support Document for the Cyanobacterial Toxin Anatoxin-a
- EPA Health Effects Support Document for the Cyanobacterial Toxin Cylindrospermopsin
- EPA Health Effects Support Document for the Cyanobacterial Microcystins Toxins
- Analytical methods for cyanotoxins
- Recommendations for Public Water Systems to Manage Cyanotoxins in Drinking Water
- EPA HABs Incident Action Checklist
- Cyanotoxin Management Plan Template and Example Plans
- Water Treatment Optimization for Cyanotoxins Document
- Drinking Water Cyanotoxin Risk Communication Toolbox
- Cyanobacteria and Cyanotoxins: Information for Drinking Water Systems Fact Sheet
- Possible Funding Sources for Managing Cyanobacterial Harmful Algal Blooms and Cyanotoxins in Drinking Water of Cyanotoxins in Drinking Water
- Video: Tools for Addressing the Risks of Cyanotoxins in Public Water Systems
- Recommended Human Health Recreational Ambient Water Quality Criteria or Swimming Advisories for Microcystins and Cylindrospermopsin
- Recreational Water Communication Toolbox for Cyanobacterial Blooms
- Recommendations for Cyanobacteria and Cyanotoxin Monitoring in Recreational Waters
- Frequently Asked Questions: Laboratory Analysis for Microcystins in Drinking Water

Non-EPA Resources on Cyanotoxins

Centers for Disease Control and Prevention (CDC)

- Harmful Algal Bloom (HAB)-Associated Illness website
- One Health Harmful Algal Bloom System (OHHABS)
- Drinking Water Advisory Communication Toolbox
- Cyanobacteria Harmful Algal Bloom (HAB) Toolkit

National Institutes of Health (NIH), National Institute of Environmental Health Sciences, Harmful Algal Blooms webpage

National Oceanic and Atmospheric Administration (NOAA)

- Ecology and Oceanography of Harmful Algal Blooms (ECOHAB) Research Program
- Monitoring and Event Response for Harmful Algal Blooms (MERHAB) Program
- NOAA Harmful Algal Bloom Forecasting System
- Harmful algal bloom forecasts: Gulf of Mexico; Lake Erie

U.S. Geological Survey (USGS)

- Field and laboratory guide to freshwater cyanobacteria harmful algal blooms for Native American and Alaska Native Communities
- USGS Microbiology Research Projects
- USGS Cooperative Water Program
- Guidelines for Design and Sampling for Cyanobacterial Toxin and Taste-and-Odor Studies in Lakes and Reservoirs

National Aeronautics and Space Administration (NASA) Citizen Scientists Track Algal Blooms website

US Army Corps of Engineer (USACE)

- USACE Louisville District
- Evaluation of the Destruction of the Harmful Cyanobacteria, Microcystis aeruginosa, with a Cavitation and Superoxide Generating Water Treatment Reactor
- Testing of the KRIA Ionizing Water Treatment System for Waters Contaminated with Diesel, PCBs, and Nutrients (Nitrogen Forms)

Non-EPA Resources on Cyanotoxins (Continue)

Water Research Foundation Resources

- Understanding Cyanobacteria and Cyanotoxins Video
- Cyanobacterial (Blue-Green Algal) Toxins: A Resource Guide
- Assessment of Blue-Green Algal Toxins in Raw and Finished Drinking Water
- Removal of Algal Toxins from Drinking Water Using Ozone and GAC
- Treating Algal Toxins Using Oxidation, Adsorption, and Membrane Technologies
- Evaluation of Integrated Membranes for Taste and Odor and Algal Toxin Control
- Rapid Detection of Cyanobacterial By-Products in Drinking Water
- Determination and Significance of Emerging Algal Toxins (Cyanotoxins)
- Development of Molecular Reporters for Microcystis Activity and Toxicity
- Early Detection of Cyanobacterial Toxins Using Genetic Methods
- Methods for Measuring Toxins in Finished Water
- Criteria for Quality Control Protocols for Various Algal Toxin Methods
- Reservoir Management Strategies for the Control and Degradation of Algal Toxins
- International Guidance Manual for the Management of Toxic Cyanobacteria
- Optimizing Conventional Treatment for Removal of Cyanobacteria and Toxins

American Water Works Association (AWWA) Resources

- CyanoTOX® Version 3.0 Calculator for public water system's oxidation options for cyanotoxins
- Water Utility Managers Guide to Cyanotoxins
- AWWA and WRF's Managing Cyanotoxins in Drinking Water: Technical Guidance Manual for Drinking Water Professionals World

World Health Organization (WHO)

- Toxic Cyanobacteria in Water, 2nd Edition
- Guidelines for Safe Recreational Waters Volume 1 - Coastal and Fresh Waters
- Water Related Diseases: Cyanobacterial Toxins
- Management of cyanobacteria in drinking-water supplies: Information for regulators and water suppliers
- Protecting Surface Water for Health. Identifying, assessing and managing drinking-water quality risks in surface water catchments
- WHO's Management of Cyanobacteria in Drinking-Water Supplies: Information for regulators and water suppliers

Interstate Technology Regulatory Council (ITRC), Strategies for Preventing and Managing Harmful Cyanobacterial Blooms Guidance

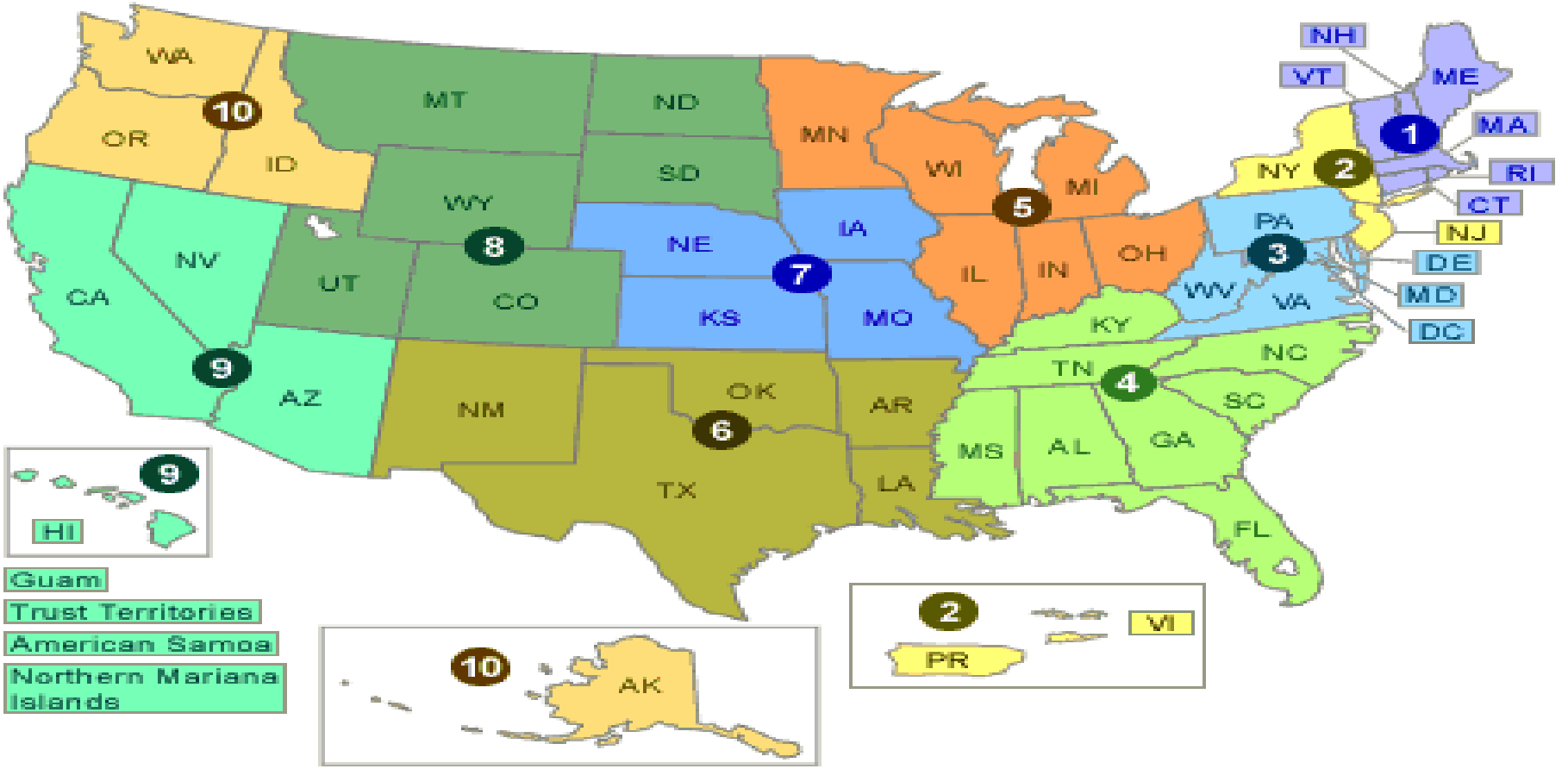
Association of State Drinking Water Administrators (ASDWA) Harmful Algal Blooms (HABs) website

Upper Mississippi River Basin Association (UMRBA) Upper Mississippi River Harmful Algal Bloom Response Resource Manual

HABs and Cyanotoxins Related Rules and Regulations

Rules and Regulations	Description
Safe Drinking Water Act (SDWA)	Federal law that protects public drinking water supplies throughout the nation. Under the SDWA, EPA sets standards for drinking water quality and with its partners implements various technical and financial programs to ensure drinking water safety. As part of the Safe Drinking Water Act, the EPA has included cyanotoxins on the 4th Contaminant Candidate List.
Drinking Water Protection Act (DWPA)	Congress amended the SDWA in 2015, directing EPA to develop and submit a strategic plan known as the Algal Toxin Risk Assessment and Management Strategic Plan for Drinking Water (submitted to congress in November 2015) for assessing and managing risks associated with algal toxins in drinking water provided by public water systems.
Unregulated Contaminant Monitoring Rule (UCMR)	Ten cyanotoxins are included in the UCMR 4 and monitored by public water systems between 2018 and 2020.
Clean Water Act (CWA)	Establishes the basic structure for regulating discharges of pollutants into the waters of the United States and regulating quality standards for surface waters. Under the CWA, EPA has implemented pollution control programs and water quality standards for all contaminants in surface waters.
Harmful Algal Bloom and Hypoxia Research and Control Amendments Act (HABHRCA)	Requires the National Oceanic and Atmospheric Administration (NOAA) and EPA to advance the scientific understanding and ability to detect, monitor, assess, and predict HAB and hypoxia events in marine (NOAA) and freshwater (EPA) in the U.S.

EPA's Regional Contact Information



Click here to see a list of Regional EPA Contacts

States Monitoring Programs

Listed below are a sample of State monitoring and resource websites on HABs and cyanotoxin events and information.

- California Water Quality Monitoring Council, HAB Portal
- Connecticut Department of Public Health, Blue Green Algae Blooms
- Delaware Division of Water, Blue-Green Algae in Delaware
- District of Columbia Department of Energy & Environment, Algae Blooms in District Waters
- Florida Department of Environmental Protection: Blue-Green Algae Information
- Idaho Department of Environmental Quality, HAB Map
- Illinois Environmental Protection Agency, HAB
- Indiana State Department of Health, HAB Map
- Iowa Department of Natural Resources, Beach Monitoring
- Kansas Department of Health and Environment, Blue-Green Algae Blooms
- Kentucky DEP Division of Water, HABs
- Maine Department of Environmental Protection, Blue Green Algae
- Maryland Department of Natural Resources, Algae
- Massachusetts Department of Health and Human Services, Algae Monitoring
- Michigan Department of Environmental Quality, Algae HAB
- Minnesota Pollution Control Agency, HABs
- Nebraska Department of Environmental Quality, Blue-Green Algae
- Montana Department of Public Health and Human Services: Public Health & Safety: HABs
- New Hampshire Department of Environmental Quality, Beach Inspections Program
- New Jersey Department of Environmental Protection, HAB
- New York Department of Environmental Conservation, HABs
- North Carolina Department of Environmental Quality, HABs Monitoring
- North Dakota Department of Environmental Quality, HABs
- North Dakota Game and Fish Department, HABs
- Ohio Environmental Protection Agency, HABs Monitoring
- Oregon Health Authority, Algae Bloom Advisories
- Rhode Island, HAB
- Texas Parks and Wildlife, HABs
- Utah Department of Environmental Quality, HAB Map
- Vermont, HAB Map
- Virginia Department of Health: Algal Bloom Surveillance Map
- Washington State Toxic Algae Online
- Wisconsin Department of Natural Resources Blue-Green Algae website

HAB or Hypoxia Event of National Significance (HHENS)

On January 7th, 2019 the ***"Harmful Algal Bloom and Hypoxia Research and Control Amendments Act of 2017"***, was reauthorized as part of the National Integrated Drought Information Systems Act (PL 115-423). The act was amended to, among other things include:

- Coastal/marine waters in the Scientific Assessments of Freshwater HABs and to complete the assessment not less than once every 5 years instead of no later than 24 months;
- Develop and maintain a publicly accessible internet website that provides information as to the HABHRCA Program activities;
- Accelerate the utilization of effective methods of intervention and mitigation to reduce the frequency, severity, and impacts of harmful algal bloom and hypoxia events;
- For NOAA to develop contingency plans for the long-term monitoring of hypoxia; and
- Include a section on Event Response Program and for the appropriate Federal Agency (NOAA for marine and EPA for freshwater) to determine an event of national significance, including the specifics on distribution of costs and donations, and factors for consideration by the appropriate Federal official declaring whether a hypoxia or harmful algal bloom event is an event of national significance.

On September 16th, 2019 the EPA issued a ***Federal Register Notice*** requesting public comment on what the Agency should specifically consider for determining a "HAB or Hypoxia event of national significance" in freshwater, and related factors in order to inform development of a draft EPA policy. The EPA in coordination with NOAA, proposed to develop a policy for determining a HAB or Hypoxia occurrence as an "event of national significance" in freshwater systems in the United States. The comment period closed on October 31, 2019.