



Application of Aquatic Pesticides and Algaecides to Reservoirs Used as a Public Drinking Water Supply

Those wishing to conduct algaecide treatments on waters of the state must comply with Ohio EPA's General NPDES Permit No. OHG870002.

Potential Release of Cyanotoxins

Cyanobacteria (also referred to as blue-green algae) can produce toxic compounds, known as cyanotoxins, which include liver toxins, nerves toxins, and skin toxins. Some of the more common cyanotoxins detected in Ohio waters include microcystins and saxitoxins. Cylindrospermopsin and anatoxin-a have also been detected. Cyanobacteria can cause other problems for drinking water treatment, such as excess organic load, taste and odor compounds. Reservoir management strategies including algaecides are often used to control cyanobacteria growth.

Cyanotoxins may be present either within the cyanobacterial cells (intracellular) or outside of the cells (extracellular). When algaecide is applied, the majority of cyanobacterial cells break open (lyse) and any cyanotoxins present in the cells are released. Conventional treatment processes for drinking water are relatively effective at removing whole cyanobacterial cells but less effective at removing extracellular cyanotoxins. Therefore, algaecide application can increase the potential for cyanotoxins to break through the treatment process and occur in finished drinking water.

Routine monitoring for total microcystins and cyanobacteria screening is required by all public water systems (PWS) using surface water sources under Ohio Administrative Code (OAC) rule 3745-90-03. Further information on monitoring requirements, cyanotoxin thresholds, analytical methods, and source water management is provided in the State of Ohio PWS Harmful Algal Bloom (HAB) Response Strategy. The current strategy and additional guidance documents are available at epa.ohio.gov/ddagw/HAB.

General Permit Requirements

Effective January 1, 2017, those wishing to apply algaecide on waters of the state are required to comply with Ohio EPA's General NPDES Permit No. OHG870002. Under this permit, all applicators must submit a Notice of Intent (NOI) for any direct application to reservoirs used as a drinking water supply for aquatic algae, weed, or nuisance animal control. The permit, NOI form and instructions are available at epa.ohio.gov/dsw/permits/GP_Pesticide.aspx.

Once the NOI form has been submitted to Ohio EPA and general permit coverage is granted, the permit will be effective until the expiration of General NPDES Permit OHG87002 on December 31, 2021. Note that a change in the chemical type of algaecide would require a new NOI.

Special Conditions

The general permit restricts operators from applying algaecides to sources of drinking water if cyanotoxin concentrations at the PWS intake exceed drinking water thresholds or if severe cyanobacterial blooms (visible scum or greater than 100,000 cells/mL) cover greater than 20 percent of the reservoir or are within 500 yards of the intake. Exemptions from this restriction can be obtained if information is provided to Ohio EPA prior to algaecide application that confirms:

- 1) The bloom is not currently producing cyanotoxins, or
- 2) The surface waters will not be used as a public drinking water source until monitoring is conducted to verify the cyanotoxin concentrations are below levels of concern, or
- 3) Finished water cyanotoxin concentrations will remain below thresholds established in the State of Ohio PWS HAB Response Strategy during and following application of the algaecide, or
- 4) Cyanotoxins are already in extracellular form and not bound within cyanobacteria cells.

The first exemption can be met if cyanotoxins are not detected in the bloom biomass. The second exemption is a

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possibility for water systems with multiple source waters or multiple reservoirs that can isolate affected waters during algaecide treatment. The third exemption was established for PWS that have advanced treatment that has demonstrated capability to remove cyanotoxins. The fourth exemption applies when the cyanotoxins are already extracellular and algaecide treatment will not cause additional cyanotoxin release. Please contact Ohio EPA (see below) to determine if any of the exemptions are applicable prior to using algaecides to treat sources while cyanotoxins are severe blooms that cover greater than 20 percent of the source water or are within 500 yards of an intake.

If cyanotoxins are present, Ohio EPA may still approve the use of algaecides following a written request from the PWS. Ohio EPA will review monitoring data, alternative source waters, and PWS treatment capacity to determine if an algaecide use is acceptable based on current conditions. This approval may require additional data and/or treatment optimization to remove extracellular cyanotoxins during drinking water treatment.

Recommendations

In addition to the severe bloom algaecide application restrictions, the permit indicates consideration of the following before applying an algaecide.

Early Algaecide Application

Algaecides can effectively control the growth of cyanobacteria when applied during the early stages of bloom development (cell count less than 10,000 cells/mL). Early application, prior to bloom development or during minor blooms, reduces the potential for release of high concentrations of cyanotoxins associated with denser blooms. Any cyanotoxins released from early stage or minor blooms may disperse and be diluted throughout the water body. When practical, Ohio EPA recommends the use of algaecides when cyanobacteria concentrations in the source water are low or blooms are not yet visually apparent.

Evaluate Threat and Consider Cyanotoxin Monitoring

During an active moderate bloom (10,000 – 100,000 cells/mL) that does not meet the severe bloom algaecide application restrictions and compliance monitoring for cyanotoxins are non-detect, Ohio EPA recommends that PWS consider additional source water monitoring to characterize the bloom. This may include identification of cyanobacteria, cyanobacteria screening using qPCR to detect cyanotoxin-production genes, and/or testing for cyanotoxins. If the bloom contains cyanotoxin-producing genera and/or genes, Ohio EPA recommends testing the source water for extracellular and total cyanotoxins. If cyanotoxins are detected in the source water, but not raw water of the treatment plant, consider additional monitoring of that source until cyanotoxins are less than 50 percent of drinking water threshold. Note that compliance monitoring cyanotoxins in raw and finished drinking water will follow the guidance in the current PWS HAB Response Strategy.

Cyanotoxin analysis depends on which cyanobacteria are present and/or detection of cyanotoxin-production genes. A list of cyanotoxins produced by different cyanobacteria is included as appendix in the PWS HAB Response Strategy. Further guidance on sampling and analytical methods and a list of labs capable of analyzing for cyanotoxins and cyanobacteria screening (qPCR) are available at epa.ohio.gov/ddagw/HAB.aspx.

Notification of Cyanobacterial Blooms

PWS that discover a potential cyanobacterial bloom on the source water should contact Ohio EPA for assistance in assessing the potential threat. Ohio EPA can assist with algae identification and, if the bloom appears severe and is in close proximity to the intake, may conduct cyanobacteria screening or collect samples for cyanotoxin analysis. PWS may contact their district HAB Coordinator and/or staff in the central office Emerging Contaminant Section for additional assistance; contact information is provided in the current PWS HAB Response Strategy. Suspected blooms can be reported to Ohio EPA through an online Bloom Report Form available at <https://arcg.is/qLSHO> or via email to HABmailbox@epa.ohio.gov. Ohio EPA staff will share information directly to the PWS that may indicate a cyanobacterial bloom, such as bloom reports, satellite imagery, hyperspectral flyover, and/or water quality data.

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Cyanotoxin Thresholds

Ohio EPA established numerical values for cyanotoxins in finished drinking water. Further details on the basis for these values and information for response to action level exceedance in finished drinking water is included in the current Ohio PWS HAB Response Strategy.

Drinking Water Threshold	Microcystins* (ug/L)	Anatoxin-a (ug/L)	Cylindrospermopsin (ug/L)	Saxitoxins* (ug/L)
Do Not Drink – children under 6 and sensitive populations	0.3	0.3	0.7	0.3
Do Not Drink – children 6 and older and adults	1.6	1.6	3.0	1.6

**The threshold values for microcystins and saxitoxins are intended to be applied to total concentrations of all reported congeners/variants.*

NSF Standard 60 Drinking Water Treatment Chemicals

In accordance with OAC rule 3745-83-01(D), all algaecides applied to Ohio drinking water reservoirs must be National Sanitation Foundation (NSF) Standard 60 approved for use in potable water applications. Formulation, application procedures, concentrations and methods must follow the manufacturer’s guidelines for the approved chemical.

Copper Monitoring

Public water systems that apply a copper compound to the water supply shall monitor for copper at least weekly for at least one month after the compound has been applied. In accordance with OAC rule 3745-83-01, monitoring must be conducted at each entry point into the distribution system.

Contact

For more information, visit Ohio EPA’s HAB website for PWSs at epa.ohio.gov/ddagw/HAB.aspx or contact staff in Emerging Contaminants Section at HABmailbox@epa.ohio.gov or (614) 644-2752.