Division of Surface Water
August 2015

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. OHG870001.

Potential Release of Algal Toxins

Some cyanobacteria (also referred to as blue-green algae) can produce toxins, including neurotoxins (affect nervous system), hepatotoxins (affect liver) and dermatotoxins (skin irritant). These toxins may be present either within the cyanobacteria cells (intracellular toxins) or outside of the cells (extracellular toxins). When algaecide is applied, the majority of cyanobacteria cells break open (lyse) and any algal toxins present in the cells are released. Conventional treatment processes are relatively effective at removing whole cyanobacteria cells but less effective at removing extracellular toxins. Therefore, algaecide application can increase the potential for toxins to break through the treatment process and occur in finished drinking water.

Microcystin is the most common algal toxin in Ohio's waters, but anatoxin-a, saxitoxin and cylindrospermopsin have also been found. True algae (also referred to as green algae) do not produce toxins.

General Permit Requirements

Effective October 31, 2011, those wishing to apply algaecide on waters of the state are required to comply with Ohio EPA's General NPDES Permit No. OHG870001. 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 Notice of Intent form has been submitted to Ohio EPA and general permit coverage is granted, the permit will be effective for five years unless there is a change in the type of algaecide. Only a change in chemical type would require a new NOI. Changes in the chemical formulation or manufacturer would not require a new NOI.

The general permit restricts operators from applying algaecides to severe cyanobacteria (blue-green algae) blooms (visible scum or > 100,000 cells/mL cyanobacteria) that 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 toxins, or

2) The surface waters will not be used as a public drinking water source until monitoring is conducted to verify the toxin concentrations are below levels of concern, or

3) Toxin concentrations will remain below thresholds established in the State of Ohio Harmful Algal Bloom Response Strategy for treated drinking water during and following application of the algaecide.

The first exemption can be met if toxins are not detected in the bloom biomass. The second exemption is a possibility for water systems with multiple source waters or multiple reservoirs. The final option was established for systems that have advanced treatment which has been demonstrated as capable of removing toxins. Please contact Ohio EPA to determine if any of the exemptions are applicable prior to using algaecides to treat severe blooms that cover greater than 20 percent of the source water or are within 500 yards of an intake.

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If toxins are present, Ohio EPA may still approve the use of algaecides if additional raw and finished water monitoring is conducted following algaecide application. At a minimum, raw water samples must be collected once per week until toxins are less than half of the drinking water thresholds for two consecutive weeks. If raw water sampling results indicate toxin levels are above any algal toxin threshold, additional finished water sampling will be necessary until toxin levels in the raw are below thresholds.

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 (including copper sulfate) can effectively control the growth of cyanobacteria when applied during the early stages of bloom development (cell count <10,000 cells/mL). Early application, prior to bloom development or during minor blooms, reduces the potential for release of high concentrations of toxins associated with denser blooms. Any toxins released 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 Toxin Monitoring

During an active moderate to severe bloom (>10,000 cells/mL) that does not meet the severe bloom algaecide application restrictions, Ohio EPA recommends that water systems identify the type of cyanobacteria present to genus level. If the bloom contains cyanobacteria that are potential toxin-producers or if the reservoir has a history of toxin-producing blooms, Ohio EPA recommends raw water monitoring for toxins following any application of algaecide. Samples should be collected once per week until toxins are less than half the drinking water thresholds for two consecutive weeks.
If the raw water sampling results indicate toxin levels are above any algal toxin thresholds, additional finished water sampling is recommended until toxin levels in the raw are below thresholds.

Toxin analysis depends on which cyanobacteria are present. A list of toxins produced by different cyanobacteria, labs capable of analyzing for algal toxins, and information about qualitative rapid field tests for microcystin are available at ***epa.ohio.gov/ddagw/HAB.aspx.***

Notification of Cyanobacteria Blooms

Public water systems that discover a potential cyanobacteria 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 algal toxin screening or collect samples for algal toxin analysis. Use Ohio EPA's online "bloom report form" to report blooms: ***epa.ohio.gov/portals/35/hab/HAB_Report_Form.pdf***.

Algal Toxin Thresholds

Ohio EPA, in conjunction with the Ohio Department of Health and the Ohio Department of Natural Resources, has developed thresholds for algal toxins in finished drinking water. If the finished drinking water exceeds these thresholds, the water system will be required to issue a public notice.

Drinking Water Threshold	Microcystins** (ug/L)	Anatoxin-a (ug/L)	Cylindro-spermopsin (ug/L)	Saxitoxin** (ug/L)
Do Not Drink – children under 6 and sensitive populations***	0.3	20	0.7	0.2
Do Not Drink – children 6 and older and adults	1.6	20	3.0	0.2
Do Not Use*	20	300	20	3

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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 public water systems at ***epa.ohio.gov/ddagw/HAB.aspx*** or contact Ohio EPA's public water system HAB Coordinator at ***HABmailbox@epa.ohio.gov*** or (614) 644-2752.