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Public Water System Harmful Algal Bloom Response Strategy

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Sections of this document were excerpted from the 2011 State of Ohio Harmful Algal Bloom Response Strategy. That strategy was developed as a collaborative effort between Ohio EPA, the Ohio Department of Natural Resources and Ohio Department of Health.

This document focuses on responding to harmful algal blooms on public water supply source waters. Revisions to the 2011 Strategy were contributed by:

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DEFINITIONS

Anatoxin-a: A nerve toxin produced by a number of cyanobacteria.

Biovolume: Volume estimated by associating phytoplankton with similar geometric forms and determining the volume of these by measuring the linear dimensions required for its calculation under the microscope (Vadrucci et al. 2007).

Blue-green algae: Photosynthesizing bacteria, also called cyanobacteria. Blue-green algae have accessory pigments such as phycocyanin that cause them to exhibit different colors. These organisms may produce toxins that can cause sickness and possibly death in exposed populations of humans and animals. Blue-green algae can be present as unicellular, colonial, or filamentous organisms. Some have the ability to fix nitrogen and/or regulate their buoyancy.

Cyanobacteria: Also called blue-green algae. See definition above.

Cyanotoxin (algal toxin): Toxin produced by cyanobacteria. These toxins include liver toxins, nerve toxins and skin toxins.

Cylindrospermopsin: A nerve toxin produced by a number of cyanobacteria.

ELISA (Enzyme Linked Immunoassay): A rapid assessment method commonly used to detect microcystins, cylindrospermopsin and saxitoxin.

HAB (Harmful Algal Bloom): A visually identified concentration of cyanobacteria that discolors the water, or a cell count greater than 4,000 cells/ml of cyanobacteria genera (Shambaugh and Brines, 2003). Accumulations of cyanobacteria cells may be present at the water surface, at a defined depth, or throughout the water column.

Finished drinking water: Treated water ready for human consumption.

Microcystin: A liver toxin produced by a number of cyanobacteria. More than 80 congeners (forms) of these toxins exist. Microcystin-LR is the most toxic congener.

Photic zone: The uppermost layer in a body of water into which light penetrates in sufficient amounts to influence living organisms, especially by permitting photosynthesis.

Saxitoxin: A nerve toxin produced by a number of cyanobacteria.

Source water: Water used as a source for public drinking water.

Scum: A cyanobacteria bloom that has a dense surface accumulation of cyanobacteria cells.

Vicinity of intake: Area where there is a likelihood of contaminants being drawn into the intake (within 500 yards of the intake).

1. INTRODUCTION

1.1 Purpose, Focus and Coordination

The purpose of the *Public Water System Harmful Algal Bloom Response Strategy* is to protect people from toxins produced by cyanobacteria that may be in sources of drinking water at concentrations that can affect human health. The strategy identifies toxin levels of concern that will be used to make advisory decisions. Sampling will target toxins that may be present at levels of concern and compare them to threshold criteria established by the State of Ohio. Sampling may be conducted by state or federal agencies, public water systems, or volunteers in accordance with the procedures outlined in this document.

A separate procedure was developed for responding to harmful algal blooms on recreational waters. The *State of Ohio Harmful Algal Bloom Response Strategy For Recreational Waters* is available online at: www.ohioalgaeinfo.com.

1.2 Cyanobacteria Causes of Concern

Cyanobacteria can produce a variety of toxins which can cause illness and death in humans and animals. These toxins include liver toxins, nerve toxins, and skin toxins. Some of the more common cyanotoxins found in Ohio waters include microcystins, cylindrospermopsin, saxitoxin and anatoxin-a. Cyanobacteria toxins can be found within cyanobacteria cells or as free toxins in the water. Toxin production is cyanobacteria strain specific, and many of these organisms can produce one or several different types of toxins. These toxins are colorless and persist in the water after a cyanobacteria bloom is gone. Toxins may degrade over time by bacterial action and sunlight.

In addition to toxin production, cyanobacteria can cause other problems in drinking water sources. The excess organic load is a concern for public water supplies, because chlorination of organic material can result in the production of trihalomethanes (carcinogen). Many cyanobacteria also produce the taste and odor compounds Geosmin and 2-Methylisoborneol (MIB) that affect drinking water quality.

1.3 Cyanobacteria Blooms

Cyanobacteria blooms vary in species composition and toxin production over time and within a water body. The distributions of cyanobacteria populations are affected by weather and lake conditions, hydrology and morphology. They may be distributed evenly throughout a lake, or may be irregularly distributed because of currents and/or prevailing winds. Hydrologic changes resulting from heavy rains or the discharge from a stream resulting in localized currents can significantly affect cyanobacteria population distributions. Areas like shallow bays, coves, sites directly affected by nutrient-rich inflows, or structures that affect flow (e.g., dikes, piers, or intake towers) can significantly affect population growth rates and cyanobacteria distribution.

Cyanobacteria may maintain a position at a particular depth, or may be found throughout the photic zone (e.g. *Planktothrix* and *Cylindrospermopsis*). Cyanobacteria may migrate vertically to different locations in the photic zone throughout the day. Surface accumulations (scum) may develop when cyanobacteria float to the surface during calm, sunny weather and may dissipate within hours as conditions change. Entire cyanobacteria populations may accumulate at 1 or 2 cm below the water surface. Surface accumulations of cyanobacteria may concentrate further when blown by wind to leeward areas like bays, inlets, or near-shore areas (with the direction of the wind). Dense accumulations may extend from the surface to depths of more than 1 m.

1.4 Emerging Issues: Euglenophycin and β-Methylamino-L-alanine (BMAA)

Since this document was last updated in 2012, additional information on two toxins that Ohio EPA had not previously monitored for (i.e., Euglenophycin and β-Methylamino-L-alanine **(**BMAA)) became available.

Euglenophycin is a newly isolated algal toxin similar in chemical structure to fire ant venom. The substance is a known ichthyotoxin and has also been linked to livestock fatalities. Data is limited on human exposure. However, there is evidence that euglenophycin can pose an acute risk to human health. The toxin is produced by *Euglena sanguinea* and other *Euglena* species. *Euglena* are not classified as cyanobacteria, but as another form of algae that can occur in nutrient enriched waters. In the summer of 2012, a red-colored *Euglena* bloom occurred in Ohio on Dillon Lake. Based on the unique coloration of the bloom, it was most likely produced by the species *Euglena sanguinea*. There is not enough data available at this time to establish drinking water exposure thresholds for euglenophycin. However, due to the possible acute exposure risk, Ohio EPA will begin monitoring for the toxin in 2013 if any potentially toxin-producing *Euglena* blooms occur on a drinking water source. Preliminary data indicate that carbon can be used as an effective treatment technology for euglenophycin toxin removal.

BMAA is a non-proteinogenic amino acid and a potential neurotoxin that has been linked to an increased incidence of amyotrophic lateral sclerosis (ALS) and Alzheimer's disease. BMAA is produced by 95% of the cyanobacteria genera tested, including *Microcystis, Anabaena, Planktothrix, Aphanizomenon, Cylindrospermopsis,* and *Lyngbya*. Toxicological data is limited and it appears that neurological impacts may largely result from exposure to BMAA through biomagnification (consumption of organisms that feed on cyanobacteria) and not through recreational or drinking water exposure. Initial toxicological data do not support an acute health risk at levels typically produced by cyanobacteria, but several studies have hypothesized a long-term exposure risk. USEPA and Ohio EPA currently do not have standards or thresholds established for the compound and the prevalence of the compound in source waters is not known. Understanding of the compound may improve now that there is a commercially available test kit for BMAA. If additional data support development of drinking water thresholds, Ohio EPA will consider that in the future. The simple chemical structure of BMAA may make treatment via oxidation or carbon absorption less effective. The most reliable method for BMAA removal may be through the removal of intact cyanobacteria cells through coagulation, sedimentation, and filtration processes.

1.5 Rationale for Strategy Development

Ohio government officials became aware of HAB development in Ohio's lakes in 2007 when the Ohio EPA participated in the National Lakes Assessment. This survey included sampling for the cyanotoxin, microcystin. In April 2009, the results of the 2007 National Lakes Assessment were released, showing that more than 36% of the randomly selected 19 Ohio lakes sampled had detectable levels of microcystin, which was higher than the national average. This revelation spurred the development of a HAB response program to ensure public awareness and safety.

A HAB response strategy is necessary for public water supplies since microcystin concentrations in raw drinking water are increasing in HAB-affected sources waters. Average microcystin concentrations in 2011 were four times higher at the City of Celina's intake (maximum concentration 43.4 ug/L) and over 14 times higher at western Lake Erie basin water systems' intakes (maximum concentration >5 ug/L) compared with 2010 concentrations. The extensive HAB on Lake Erie in 2011 was considered the worst in 30 years, with

microcystin concentrations exceeding 1000 ug/L in the open water of the western basin. Microcystin concentrations at the City of Celina's intake were even greater in 2012 (maximum concentration >100 ug/L) but concentrations in Lake Erie were much lower. This was due in part to a severe drought that limited nutrient input from the Maumee River into Lake Erie to historically low levels. Overall, cyanotoxins were detected in the majority of source waters sampled in 2010, 2011, and 2012.

Advanced water treatment technologies have been effective at eliminating toxins in treated water, but without advanced treatment toxins have the potential to enter drinking water. Toxins were detected in treated drinking water only one time in 2010, at a concentration below drinking water thresholds. Implementation of reservoir management strategies and optimization of drinking water treatment should reduce the potential threat cyanotoxins pose to human health. This strategy is needed to provide a consistent and timely response to HABs on public water system source waters and help ensure treatment technologies are effective at toxin removal when toxins are present in the source water.

1.6 HAB Reporting

Individuals reporting HABs are encouraged to fill out a form on Ohio EPA's HAB website and e-mail the form, with attached digital photographs if available, to Ohio EPA's HAB Mailbox (***HABMailbox@epa.ohio.gov***). All HAB reports and HAB data (algal toxin and phytoplankton data, and photographs) will be entered into a database housed at Ohio EPA. An interactive map will be located on Ohio EPA's HAB website, ***ohioalgaeinfo.com,*** which links to all the HAB toxin data for public lakes and source water, advisory postings, press releases, and other pertinent information. A separate website was developed specifically for public water supply operators, and contains additional information on algal toxin treatment, algal toxin test kits, bloom characterization and more: ***http://www.epa.ohio.gov/ddagw/HAB.aspx***

2. CYANOTOXIN TOXICITY THRESHOLDS

2.1 Introduction

This section is intended to provide guidelines for Ohio EPA in responding to HABs on sources of drinking water. Included in this document are algal toxin thresholds protective of human health in drinking waters.

These guidelines were recommended by a committee that included representatives from Ohio EPA, ODH and ODNR and were adopted by the Directors of those state departments. The state of the science of HABs and their related toxins is evolving, and these guidelines may require updating, revising, and/or may become obsolete with the issuance of new toxicity information or national algal bloom guidance or policy.

2.2 Human Health Impacts

Cyanobacteria are organisms that are found in all bodies of water. Under favorable conditions (nutrient availability, light, and heat) cyanobacteria can multiply and create a bloom becoming visible to the naked eye. These blooms generally occur in eutrophic or hypereutrophic water bodies. Eutrophication is most often the result of an elevated supply of nutrients, particularly nitrogen and phosphorus, to surface waters that results in enhanced production of primary producers, particularly phytoplankton and aquatic plants (Prepas and Charette 2003).

These organisms have the ability to produce some of the most potent toxins known to humankind. These toxins can affect liver and brain function. Many of the cyanobacteria produce toxins that can cause skin irritation. Due to the potency of these toxins and no known antidote, it is recommended that public health and other regulatory agencies take a conservative approach with human exposure to these toxins when setting recreational water thresholds.

Many of the health symptoms associated with exposure to cyanotoxins can mimic other illnesses and diseases and therefore may not be readily recognized by the medical community or the public. Some of these symptoms include nausea, skin rashes, gastro-intestinal distress, disorientation, numbness and fatigue. Increasing the level of awareness through education within the medical community, general public and government agencies is strongly recommended in order to determine the public health impact of these cyanotoxins.

During the summers of 2010 and 2011 in Ohio there were a number of harmful algal blooms of concern identified. A number of illnesses related to the recreational exposure to algal toxins were reported to the Ohio Department of Health and an epidemiological investigation was conducted. The questionnaire provided by the Centers for Disease Control and Prevention (CDC) was modified for the outbreak in consultation with the CDC. Case definitions were established as follows:

> **Suspect Case:** Exposure to water or to seafood with a confirmed algal bloom AND onset of associated signs and symptoms within a reasonable time after exposure AND without identification of another cause of illness.
>
> **Probable Case:** Meets criteria for *Suspect Case* AND there is laboratory documentation of a HAB toxin(s) in the water.
>
> **Confirmed Case:** Meets criteria for a *Probable Case* combined with professional judgment based on medical review.

In 2010 there were 48 human illness reports that met the suspect and probable case definition and 5 dog deaths associated with recreational exposure to cyanobacteria blooms. There were no reported illnesses associated with drinking water exposure to cyanotoxins.

2.3 Algal Toxin Thresholds for Drinking Waters

Prior to developing any algal toxin thresholds, the committee considered numerous risk assessment frameworks, exposure assumptions, and toxicity values from state, national, and primary literature sources. The committee made the recommendations presented here based on the best scientific information, guidance, and public policy available at the time. However, the committee recognizes that as the science and policy evolve, it will likely become necessary to reevaluate the recommendations presented here.

Additionally, the committee agreed that the recommended thresholds would be protective of human exposures. The thresholds given here may or may not be protective of animals such as dogs or livestock. As mentioned previously, at this time Ohio EPA does not believe there is enough data available to establish numeric thresholds for euglenophycin or BMAA.

2.3.1 Numeric Thresholds

Threshold (µg/L)	Microcystin**	Anatoxin-a	Cylindrospermopsin	Saxitoxin**
Drinking Water - Do Not Drink	1	20	1	0.2
Drinking Water - Do Not Use*	20	300	20	3

* The Drinking 'Do Not Use' thresholds are based on the Recreation No Contact Advisory thresholds.
**Microcystin and saxitoxin thresholds are intended to be applied to total concentrations of all reported congeners of those toxins.

2.3.2 Basis for Thresholds

Toxicity values for microcystin, anatoxin-a, cylindrospermopsin, and saxitoxin were selected for the establishment of recreational and drinking water thresholds. The toxicity values are referred to as either "reference doses (RfDs)" or "tolerable daily intakes (TDIs)". Either one is intended to represent a "safe" dose for humans, below which no toxic effect is to be expected. The values are expressed in milligrams per kilogram body weight per day (mg/kg-day). Both RfDs and TDIs include safety factors of between 3 and 3000, depending on the number, variety, and quality of the available studies. The values are derived to account for varying lengths of exposure to the toxins, including an acute exposure, which can be as short as one day, a short-term exposure, a subchronic exposure, and a chronic (or lifetime) exposure. Not all toxins have all four exposure lengths assessed, depending on the toxin-specific data available specific to the toxin.

2.3.2.1 Anatoxin-a

U.S. EPA's draft toxicological review of anatoxin-a from 2006 was used as the basis for the toxin thresholds presented here. Although the document was draft at the time of the

threshold development, it contained the most recent, relevant, and well-reviewed studies available for anatoxin-a. Short-term and subchronic reference doses (RfDs) are given in the review. U.S. EPA determined that data were inadequate to develop acute or chronic RfDs. After considering both the short-term and subchronic RfDs, the committee decided to use the subchronic RfD to develop toxin thresholds. The committee's rationale for this decision was that the thresholds developed using the subchronic RfD were closest to the thresholds for anatoxin-a in use by other states and organizations (e.g., California, Washington). The subchronic RfD is from a 7 week rat drinking water study, and is 0.0005 mg/kg-day based on systemic toxicity, which includes an uncertainty factor of 1000. The uncertainty factor includes a factor of 10 for rat to human variability, 10 for variability among humans, and 10 for database deficiencies, including limitations within the study used as the basis for the RfD, lack of reproductive studies, and lack of toxicity testing in a second species.

2.3.2.2 Cylindrospermopsin

U.S. EPA's draft toxicological review of cylindrospermopsin from 2006 was used as the basis for the toxin thresholds presented here. Although the document was draft at the time of the threshold development, it contained the most recent, relevant, and well-reviewed studies available for cylindrospermopsin. The only RfD developed for cylindro-spermopsin is for subchronic exposures, based on an 11 week mouse study. The RfD is 0.00003 mg/kg-day based on increased kidney weight, which includes an uncertainty factor of 1000. The uncertainty factor includes a factor of 10 for mouse to human variability, 10 for variability among humans, and 10 for database deficiencies, including the lack of a chronic study, lack of a study in a second species, and the lack of reproductive or developmental studies.

2.3.2.3 Microcystins

The committee reviewed both U.S. EPA's 2006 draft toxicological review of microcystin LR, RR, YR, and LA, as well as the World Health Organization's (WHO) 2003 microcystin-LR in drinking water background document. The committee generally found the U.S. EPA toxicological review to be more recent and inclusive of available studies evaluating microcystin toxicity. However, the committee decided to use the WHO tolerable daily intake (TDI, similar to an RfD) instead of U.S. EPA's RfD for microcystin, owing to the widespread use and acceptance of the TDI by a variety of other governments and organizations evaluating algal toxin risks. The committee agreed that should U.S. EPA finalize its microcystin toxicological review, revisiting the microcystin threshold values would be appropriate.

The WHO TDI is 0.00004 mg/kg-day, derived from a 13-week mouse study. The basis for the TDI is liver pathology, and includes an uncertainty factor of 1000. The uncertainty factor includes a factor of 10 for mouse to human variability, 10 for variability among humans, and 10 for database deficiencies, including the lack of chronic data and carcinogenic studies.

2.3.2.4 Saxitoxin

Neither U.S. EPA nor WHO have, at the time of this report, issued an RfD or TDI for saxitoxin. To develop a saxitoxin guideline, the committee reviewed information in the Report of the Joint FAO/IOC/WHO ad hoc Expert Consultation on Biotoxins in Bivalve Molluscs from 2004, as well as a peer-reviewed paper by Galváo et al. 2009 in the journal Toxicon, Saxitoxins Accumulation in Freshwater Tilapia (Oreochromis niloticus) for Human Consumption. The joint FAO/IOC/WHO report recommends an acute reference dose for saxitoxins of 0.0007 mg/kg-day, but does not establish a TDI. The report does not describe the toxicological basis for the recommended value.

The Galváo et al. paper states that "From available reports on exposure in humans, a lowest- observed-adverse-effect-level (LOAEL) in the region of 1.5 ug STXs/kg b.w. could be set, and an estimated no-observed-adverse-effect-level (NOAEL) of 0.5 ug STXs/kg b.w. was established. Thus the CONTAM panel has defined an acute reference dose (ARfD) of 0.5 ug STXs/kg b.w." The citation given in the Galváo paper is the European Food Safety Authority, 2009, Marine Biotoxins in Shellfish – Saxitoxin Group Scientific Opinion of the Panel on Contaminants in the Food Chain.

Using the WHO and U.S. EPA method of applying an uncertainty factor to the NOAEL to derive an RfD or TDI, the committee agreed to apply an uncertainty factor of 100 to the NOAEL-based ARfD, 10 for human variability and 10 for a lack of chronic, developmental, and reproductive studies. The resulting value for use in calculating a saxitoxin threshold is 0.000005 mg/kg-day.

2.3.3 Exposure Assumptions

Adults were assumed to have a body weight of 60 kg, based on exposure assumptions from WHO Guidelines for Safe Recreations Water Environments, Volume 1, 2003. Recreational ingestion of water was assumed to be 0.1 liters per event. Adults were assumed to drink 2 liters of water per day. Ingestion rates were taken from U.S. EPA's Exposure Factors Handbook.

2.3.4 Calculations

The basic calculation used in developing all thresholds is:

$$\text{Threshold} = \frac{\text{BW x TDI or RfD}}{\text{IR}} * \text{CF}$$

Where:

BW = Body weight in kg
TDI = Tolerable Daily Intake in mg/kg-day
RfD = Reference Dose in mg/kg-day
IR = Ingestion Rate in L/day
CF = Conversion Factor, 1000 μg/mg
Threshold given in μg/L

3. MONITORING STRATEGY

Ohio EPA's Division of Drinking and Ground Waters (DDAGW) will use a tiered response approach for monitoring Harmful Algal Blooms (HABs) and algal toxins at Ohio Public Water Systems (PWSs). This monitoring strategy is designed to take advantage of additional types of data which may be obtained in coordination with the PWS. This approach will more effectively utilize the agency's limited resources by working with our PWSs to help screen and report potential blooms. While Ohio PWSs are encouraged to conduct raw and finished water for algal toxins, they are not currently regulated and Ohio PWSs are not required to conduct monitoring. This places the onus for monitoring on the State of Ohio along with the voluntary efforts of PWSs. The monitoring strategy presented below helps target costly toxin analyses to source waters with conditions more likely to produce toxins above levels of concern and to PWSs with treatment processes that may be less effective at removing elevated toxin levels. The decision to issue a drinking water use advisory will be based on detections of algal toxins above thresholds in finished water, as identified in the Ohio EPA policy "Responding to Algal Toxin Detections in Finished Water Samples at Public Water Systems" (See Appendix A).

Overall, the results of Ohio EPA's 2010 and 2011 algal toxin sampling indicate that high levels of toxins primarily occurred when a severe cyanobacterial bloom was present. Data from the western basin of Lake Erie showed a moderate positive correlation between microcystin concentration and both water temperature and pH. There was no correlation between microcystin concentration and turbidity. In several instances, cyanotoxin concentrations were greatest at the intake prior to scum formation, when cyanobacteria were more evenly distributed throughout the water column. Finished water sampling for algal toxins showed that treatment processes used by most surface water treatment plants in Ohio were effective. In particular, activated carbon appears to be an important treatment component, as suggested by numerous studies and reflected in Ohio EPA's data. Ohio EPA DDAGW will utilize bloom severity and PWS treatment information to target algal toxin monitoring on drinking water sources most at risk.

Ohio EPA's monitoring strategy for PWSs is based on three levels of response: Observation, Screening, and Algal Toxin Monitoring.

3.1 Observation

Ohio waters will be under increased observation for HABs through direct surveillance by water system personnel, HAB reports submitted via Ohio EPA's website, NOAA satellite imagery and analysis and water quality surveys conducted by Ohio EPA and other state or local organizations.

3.1.1 PWS Surveillance

DDAGW will provide information on cyanobacterial bloom identification and associated water quality indicators to all PWSs currently using surface water sources. If a PWS observes changes in raw source water quality commonly associated with an algal bloom (pH increase, shortened filter run times, increased chlorine demand, or taste and odor event) they should inspect the reservoir for visual evidence of a bloom and coordinate with Ohio EPA to determine if cyanobacteria/toxin screening is necessary.

3.1.2 HAB Report via Ohio EPA Website

A bloom may be observed by Ohio EPA staff, public water supply operators, Ohio Department of Natural Resources staff, other State or local organizations or the general public. Anyone observing a bloom may report it to Ohio EPA by e-mailing the HAB Report Form, found at ***ohioalgaeinfo.com***, to the HAB Mailbox (***HABMailbox@epa.ohio.gov***) or by calling the HAB coordinator at (614) 644-2752. In the event that Ohio EPA receives a report of a bloom on a public water supply source, Ohio EPA will contact the PWS and request that they investigate the bloom and report on the following: visual appearance of the water (digital pictures if possible), pH, temperature, and any other raw water quality data available. If a bloom is present, the PWS will be requested to provide information on extent of the reservoir affected, proximity of the bloom to the intake, depth of the intake, and treatment currently in use or available for use. Ohio EPA will also ask the PWS for any available information on the algae conditions in their source waters, including algae identification, chlorophyll a, cells counts and biovolume. Based on the information available, Ohio EPA will determine if cyanobacteria/toxin screening or algal toxin monitoring should be initiated.

3.1.3 NOAA HAB Satellite Surveillance

Ohio EPA will review all NOAA HAB reports and MODIS/MERIS satellite data and if any drinking water sources are indicated to have moderate to severe cyanobacterial blooms DDAGW will contact the PWS operator and request an immediate inspection of the reservoir/water source. As described above, if a bloom is present, the PWS will be requested to provide information, including the extent of the reservoir affected and proximity of the bloom to the intake. Based on the information provided, Ohio EPA will determine if cyanobacteria/toxin screening or algal toxin monitoring should be initiated.

3.1.4 Ohio EPA Water Quality Surveys

Ohio EPA collects water quality data as part of its inland lakes program and other monitoring programs. In the event that these data indicate the presence of a HAB, Ohio EPA will notify the PWS, evaluate the data, and determine if additional screening or toxin monitoring is needed.

3.2 Bloom severity

A bloom will be described as severe, moderate or minor based on cyanobacterial cell counts, biovolume, and other factors such as the presence of surface scum. Extent of the reservoir affected and proximity to the intake may also be considered. It may be necessary to make an initial assessment based on visual evidence, which can then be refined as additional information is collected. Guidance for characterizing the severity of the bloom based on visual appearance will be provided to Ohio EPA staff and PWS operators, including a picture gallery of blooms. Since a severe bloom may not form a surface scum, in the absence of any additional data a visible bloom should be regarded as severe until additional data is collected.

- Severe bloom (meets any of the following):
  - cell count > 100,000 cells/mL
  - biovolume > 10 mm^3/L
  - chlorophyll a* > 50 µg/L
  - significant scum or surface accumulation is present and/or significant concentration of cells are visible throughout the water column
  - presence of cyanotoxins, as indicated by test kit or lab analyses

- Moderate bloom (meets any of the following):
    - cell count 10,000-100,000 cells/mL
    - biovolume 1-10 mm^3/L
    - chlorophyll a* 5-50 µg/L (note: proposed lake habitat use impairment level is > 14 µg/L for all but Western Allegheny Plateau, which is > 6.2 µg/L)
    - minor scum or surface accumulation and/or bloom is visible throughout the water column
- Minor bloom (meets any of the following):
    - cell count 4,000-10,000 cells/mL
    - biovolume 0.4-1 mm^3/L
    - chlorophyll a* 2-5 µg/L
    - some visual evidence of a bloom

*Chlorophyll a values are based on quantitative in vitro analysis. Semi-quantitative in vivo chlorophyll a readings can also been used if they have been corrected for turbidity effects. Real-time in vivo chlorophyll a analysis is also helpful if a water system is primarily interested in relative changes in chlorophyll concentrations over time, but not as concerned with the precise chlorophyll a concentration.

In some situations a severe bloom may be present but not visually evident. This can be the case with toxin-producing *Planktothrix rubescens* blooms that can occur at significant depth in the water column and not be visible at the water surface and with *Cylindrospermopsis* blooms that can resemble turbid brownish-green water. These blooms do not appear like the more typical blue or green colored scum-forming cyanobacteria blooms and can pose a monitoring challenge. It is always best to confirm a bloom is not present through microscopic analysis of a raw water sample.

The decision to continue observation, conduct screening or proceed to toxin monitoring will be determined on a case by case basis after considering the following factors:

- Severity of bloom, location of bloom, size of reservoir and extent of the reservoir affected
- Likelihood of cyanobacterial cells or toxins being drawn into the intake, including proximity of bloom to the intake, depth of the intake and wind/weather conditions
- Whether advanced treatment is in use and working properly (e.g. granular activated carbon, powdered activated carbon, ozonation)
- Whether the PWS has observed changes in their raw water quality (e.g. taste and odor events or pH increases) associated with presence of a bloom
- Reported human illness or animal death associated with a cyanobacterial bloom
- Results of screening indicate toxins may be present at levels of concern in raw or finished water
- History of toxin-producing blooms

The following table can be used as a guideline for determining the response action:

Table 1 – Guideline for Determining Response Actions

Bloom Severity	Likelihood of Being Drawn into the Intake	Advanced Treatment	Action
Severe	more likely	not in use, or not working properly	**Sample Toxins**
		in use	**Sample Toxins**
	less likely	not in use, or not working properly	Screen
		in use	Screen
Moderate	more likely	not in use, or not working properly	**Sample Toxins**
		in use	Screen
	less likely	not in use, or not working properly	Screen
		in use	Observe
Minor	more likely	not in use, or not working properly	Screen
		in use	Observe
	less likely	not in use, or not working properly	Observe
		in use	Observe

The type and amount of data available will be site specific and the following description of each level of response explains when and how data will be collected to determine bloom severity and appropriate responses.

3.3 Screening

When conditions indicate screening is warranted, Ohio EPA will encourage the PWS to assess the algae conditions in their source waters, including algae identification, chlorophyll a, cells counts and biovolume. A number of Ohio PWS already conduct this type of monitoring and nearly 50% of the 64 respondents to a recent Ohio EPA PWS survey indicated they collect some amount of algae count or identification data. Rapid toxin test kits for microcystin analysis may also be used at this level to indicate if additional follow-up is needed.

3.3.1 Screening Options

Options for screening may include the following as directed by Ohio EPA:

- Phytoplankton analysis: identification of cyanobacteria genera present and cell count or biovolume information
- Rapid toxin test kits for microcystin: quick tube kits provide a visual color indication of presence above 0.5 μg/L microcystin

3.3.2 Conduct screening when any of the following conditions occur

- Ohio EPA receives observational information that a bloom is present, unable to determine severity of bloom
- PWS observes changes in raw water quality (e.g. taste and odor event or pH increases) associated with presence of a bloom
- Severe cyanobacterial bloom that is less likely to be drawn into the intake
- Moderate cyanobacterial bloom that is:

- less likely to be drawn into the intake (no advanced treatment)
- more likely to be drawn into the intake (advanced treatment)

The PWS will share screening results with Ohio EPA if they conduct the analysis. Ohio EPA will determine whether to conduct additional screening, proceed to algal toxin monitoring, or return to observation.

3.3.3 Sample Location

To characterize the bloom severity a phytoplankton sample should be collected in the scum or biomass in areas where the bloom is concentrated. Samples collected for toxin screening should be collected from the raw water tap in order to characterize the quality of water entering the treatment system. Finished water samples for toxin screening should be collected at the entry point to the distribution system. Samples should be collected in accordance with the procedures outlined in the Section 4.

3.4 Algal Toxin Monitoring

3.4.1 Conduct algal toxin sampling when any of the following conditions occur

- Severe cyanobacterial bloom that is more likely to be drawn into the intake
- Moderate cyanobacterial bloom that is more likely to be drawn into the intake where advanced treatment is not in place or not working properly
- Reported human illness or animal death associated with a cyanobacterial bloom
- Results of screening indicate toxins may be present at levels of concern in raw or finished water

Algal toxin monitoring will include raw and finished water samples. The algal toxins targeted will depend on the conditions of the bloom. Microcystin will be tested in each sample unless the bloom is not a known microcystin producer. Other toxins such as cylindrospermopsin, anatoxin-a, and saxitoxin may be analyzed if a majority (> 50%) of cyanobacterial cells are those that can produce toxins other than microcystin and are not microcystin producers. Additional toxin testing will be determined on a case by case basis depending on the predominant genera and the toxins they can produce, as well as any reported health effects from ODH.

Toxin monitoring should continue weekly or every other week until toxins are less than 50% of the algal toxin thresholds in the raw and finished water in two consecutive sampling events. Public water systems will return to screening or surveillance according to the current condition of the bloom. If treatment has been proven to be consistently effective at toxin removal, Ohio EPA may consider decreasing sampling frequency.

Samples should be collected in accordance with the procedures outlined in Section 4. Ohio EPA DDAGW district or central office staff will collect the samples and ship to DES for toxin analysis (or another lab for parameters DES is not capable of analyzing). Public water systems may choose to conduct their own monitoring. In this event, Ohio EPA will request that they submit the results for review. If the PWS submits the results in a timely manner then Ohio EPA may not need to conduct duplicative sampling.

Raw and finished algal toxin data will be posted on Ohio EPA's website. Data from sampling conducted by the PWS will be posted on Ohio EPA's website only with the agreement of the PWS.

3.4.2 Euglena Bloom Response

If a *Euglena Sanguinea* bloom or other potentially toxin-producing *Euglena* bloom occurs on a drinking water source Ohio EPA will sample the bloom for the presence of euglenophycin toxin. Since little is known about this toxin, the highest biomass of the bloom will be sampled for phytoplankton identification to species level and eugenophycin analysis. The raw and finished drinking water will also be sampled for euglenophycin analysis.

3.5 Drinking Water Use Advisories

The decision to issue a drinking water use advisory will be based upon detections of algal toxins above thresholds in finished water in accordance with the Ohio EPA Policy "Responding to Algal Toxin Detections in Finished Water Samples at Public Water Systems." The complete policy can be found in Appendix A.

3.6 Coordination

Ohio EPA DDAGW district office staff will be responsible for communication with the public water systems to collect status updates, screening or sampling results. The PWS HAB Coordinator will assist the district office as needed. The district office staff will forward information to the PWS HAB Coordinator in central office who will coordinate with the Ohio EPA Division of Surface Water and other state and federal agencies. The PWS HAB Coordinator will also review the NOAA HAB satellite data as it becomes available and share information on potential HABs at water supplies with the district and water system. The PWS HAB Coordinator will consult with central and district office management to determine the appropriate response, including when to conduct or cease monitoring and issuance of public drinking water advisories. District office staff will assist with collection of phytoplankton and toxin samples if determined necessary. The PWS HAB Coordinator will post toxin results on Ohio EPA's HAB website.

4. HAB SAMPLING PROTOCOL

This sampling protocol is designed to be responsive to HAB reports in drinking water sources so that public health may be protected.

Generally, phytoplankton and toxin samples will be collected by Ohio EPA, ODNR or ODH at publically owned lakes and source waters. However, other collectors, such as lake managers, Army Corps of Engineers, public water supply operators and volunteers should also use this guidance so that collection methodology is consistent.

4.1 Materials

For basic phytoplankton grab sample and toxin collections at public water systems:

- Plastic disposable gloves
- For toxin collections: Two 1-quart Cubitainers™ or other Ohio EPA-approved containers (one for raw water tap and one for finished water tap)
- For phytoplankton collections: Two 1-quart Cubitainers™ or other Ohio EPA-approved containers (one for phytoplankton from raw water tap or from source water sample if bloom is not in vicinity of intake, and one for additional scum sample, if needed)
- 40 ml vials from DES pre-dosed with preservative for saxitoxin collection (if requested by HAB Coordinator)
- For Euglenophycin collections: Three 1-liter glass amber jars (one for finished water, one for raw water, and one for maximum biomass/scum sample)
- Lugol's iodine (can preserve at office, if vial unavailable to take to field)
- Digital camera to record appearance of bloom, if available (submit to HAB Coordinator)
- Cooler with wet ice or ice packs
- Waterproof permanent marker
- Large trash bags and twist ties (to contain ice in cooler)
- Chain of Custody Report and Sample Submission Forms (one for each sample) (See Appendix D)
- FedEx or UPS shipping labels
- If collecting raw water or scum samples directly from water source these additional supplies may be necessary:
    - Elbow length or shoulder-length gloves (to protect skin from toxin irritation if sampling at depth)
    - Goggles, and mask for over nose and mouth (if wind is aerosolizing water droplets)
    - Plastic knee boots, hip waders, or chest waders – if collecting samples requires wading off shore
    - Personal flotation device (PFD) - if collecting samples requires wading off shore

  If appropriate protective sampling gear is not available the sampler should avoid contact with the source water and only collect samples from the raw and finished water plant taps.

4.2 Safety Precautions

Safety must come first when sampling HAB toxins. Shoulder-length gloves should be worn when sampling HABs in open water. Goggles should be worn to prevent spray from getting into the eyes. Chest waders should also be worn if collecting a toxin sample when wading off the shore to protect skin from contact with toxins. A personal floatation device should be worn. Avoid inhaling spray from boats, wind, or irrigation water from areas with harmful algal blooms. Wear a mask to prevent inhalation of spray.

Do not ingest or allow the water to come in contact with the skin. Always wash hands after sampling and do not touch hands to mouth or other exposed areas of the body before washing. All equipment, gloves, and waders should be rinsed with de-ionized water (not lake water) after collections.

4.3 Preparations

Ohio EPA staff should plan weekly sampling early in the week and ship overnight for next day delivery by 14:00 so the sample can be properly processed and so that results will be ready by the weekend. On the Friday before routine sampling occurs, if shipping to the DES Laboratory for analysis, contact the DES Sample Coordinator at (614) 644-4243 and tell him how many samples will be collected and when they will be delivered to DES. Be sure to contact the DES sample coordinator with any questions before shipping.

If conducting last minute emergency HAB response sampling, contact the HAB Coordinator first and she will coordinate sample receiving with DES.

4.4 Sample Collection

4.4.1 Label Information

Label the collection containers with a waterproof marker or attach a label to the outside of the container and mark with a waterproof marker. Include the following information:

Site Name
Date
Time
Preservative (if applicable)

If using glass containers with paper labels, fill out the label and then cover it with clear plastic tape. This will prevent the label from coming off once the container is placed on ice.

4.4.2 Phytoplankton Samples

To help characterize the bloom severity, collect samples from the scum or biomass in the areas where the bloom is concentrated using a clean 1-quart Cubitainer™ or other Ohio EPA-approved container. The densest bloom may be near the surface or at a different depth. If the bloom is not at a distinct location, but diffuse throughout the water column, consider using a composite sampler that includes collection from a range of depths. If collecting a scum, collect a sample from the scum-water surface interface. Ideally samples should be preserved at the time of collection with Lugol's iodine solution at a ratio of 1:100; although Lugol's can be added to a sample anytime within eight hours. To achieve a 1:100 ratio add approximately 1 ml of Lugol's iodine solution per 100 ml of sample. Final Lugol's solution in a sample should be 1%. Final preserved sample color should be that of weak tea. Sample should be kept on wet ice and in the dark during transport. Do not freeze phytoplankton samples. Doing so will make cyanobacteria identification difficult.

If public water systems are collecting phytoplankton samples and do not have Lugol's iodine, the sample should be collected as close to the shipping time as possible to minimize holding times. Samples received by DES that are not preserved with Lugol's iodine will be preserved upon receipt at the lab. All samples will be analyzed for phytoplankton identification, but the results may be labeled as qualified if the sample was not preserved and a 12 hour holding time was exceeded.

4.4.3 Cyanotoxin Samples

Using clean 1-quart Cubitainer™ or other Ohio EPA-approved containers, collect samples from the raw water tap and from finished water at the entry point to the distribution system. Sample preservatives are not needed. If saxitoxin analysis will be performed, collect additional samples from the same locations using 40 ml preservative pre-dosed glass vials. Immediately put all toxin samples in a dark cooler on wet ice or ice packs.

If a sample will not arrive for processing at the laboratory within 24 - 36 hours, the sample must be frozen in a standard freezer until it is processed. If freezing saxitoxin samples, the sample should first be mixed by repeatedly inverting the sample vial and then half the sample volume should be decanted and disposed of prior to freezing (to avoid breaking glass vial). Saxitoxin samples should lay longwise in the freezer (not upright). Samples received at DES frozen will take four hours for quart containers or smaller to thaw, so sample turn-around times may be delayed.

4.4.4 Euglenophycin Samples

Using clean 1-liter glass amber jars, collect samples from the raw water tap, from finished water at the entry point to the distribution system, and collect a maximum biomass sample or surface scum (if present). Sample preservatives are not needed for euglenophycin. A separate phytoplankton sample should be collected using either a 1-quart Cubitainer™ or 120 ml glass sample bottle. Phytoplankton samples should be preserved with Lugol's iodine (see section 4.4.2 for detailed phytoplankton sampling instructions). Samples should NOT be iced unless instructed by central office staff to do so (sample should be maintained at ambient water temperature and temperature swings great than 30 degrees should be avoided). Contact Ohio EPA central office as soon as you become aware of a potential Euglena bloom to coordinate shipment of samples to Texas A&M University's Center for Coastal Studies for analysis.

4.4.5 QA/QC

Ohio EPA will use quality assurance/quality control procedures that meet quality objectives for HAB sampling.

4.5 Toxin Processing Instructions

At the laboratory, total toxin (free toxins and endotoxins stored within cyanobacteria cells) shall be determined for public water system sample analysis. Raw water samples should be processed to ensure all algal cells are lysed. Utilizing an ultrasonicator is a preferred option, however care must be employed to prevent any loss of the toxin while sonicating. This will mean careful selection of the processing parameters for the type of sonicator used, and possibly sonicating the sample in a cold water bath. DES will sonicate all raw water samples submitted to them. Additional lysing options for public water systems wishing to conduct their own analysis include freezing and thawing a sample three times or using a commercial "quicklyse" chemical prior to toxin analysis. Since the treatment process is effective at cell removal and lyses, treated water samples will not need to be additionally processed to lyse cells. For euglenophycin analysis the Center for Coastal Studies will complete both free and total toxin analysis for each sample.

4.6 Paperwork

For all samples that will be submitted to DES, fill out a Chain of Custody Report and Sample Submission Forms (one for each sample, see attached templates in Appendix C). Ohio EPA staff can use the cyberintern program to print out the necessary forms and sample container labels. Put the paperwork in double ziplock-type bags and seal each bag well. Place the paperwork on the samples in the cooler.

4.7 Shipping

Contact the appropriate laboratory prior to shipping samples (see Appendix B). All samples sent to the Center for Coastal Studies need to be coordinated through Ohio EPA central office. Include any paperwork required by the receiving laboratory. Make sure that the data are reported back to the sample submitter and to the HAB Coordinator so that data can be entered into the HAB database.

Ice packs should be used if shipping via Fed-EX and wet ice sealed in plastic bags or ice packs can be used if shipping with UPS or a courier. The sample container should be sealed with tape to avoid melting ice leaking out of the container during shipment.

If shipping to DES, send the samples overnight to the DES Sample Coordinator at the DES laboratory. Samples may be shipped Monday through Wednesday, and received by DES by 14:00 Tuesday through Thursday. Any samples received after 12:00 (noon) on Thursday will be frozen and analyzed the following week. In special circumstances a rush sample may be requested and a Friday morning delivery may be accepted. Samples must not be shipped on a Friday or the day before a holiday because no one will be available to receive them. If samples cannot arrive within that timeframe, samples must be frozen to preserve the toxin until they are shipped to DES the following week.

APPENDIX A -
OHIO EPA POLICY
"RESPONDING TO ALGAL TOXIN DETECTIONS IN FINISHED WATER SAMPLES AT PUBLIC WATER SYSTEMS"

Ohio Environmental Protection Agency
Division of Drinking and Ground Waters

(THIS POLICY DOES NOT HAVE THE FORCE OF LAW)

Responding to Algal Toxin Detections in Finished Water Samples at Public Water Systems

Division DDAGW
Number: WQ-18-001
Category: Water Quality – Policy
Status: FINAL
Issued: June 23, 2011

I. PURPOSE

This document describes the process that Ohio EPA Division of Drinking and Ground Waters (DDAGW) will follow when an algal toxin is detected in finished water samples at public water systems, and provides a recommended course of action for public water systems.

II. BACKGROUND

Ohio EPA is conducting sampling at public water supply lakes around the state as part of an Inland Lakes Program (***www.epa.ohio.gov/dsw/inland_lakes/index.aspx***). Lake sampling will include a complete lake assessment with algae speciation and toxin analysis. A number of lakes used as a source of public drinking water may be sampled each year. In the event Ohio EPA receives a report of significant algal blooms, sampling at additional public water supply sources may occur, in accordance with the "Ohio Harmful Algal Bloom Response Strategy."

Algal toxins in drinking water are not currently regulated by the U.S. Environmental Protection Agency, but are being considered for future regulation. Microcystin-LR appears along with other algal toxins on U.S. EPA's Contaminant Candidate List 3 (CCL3), which is used to prioritize research and data collection efforts to aid the decision on whether a specific contaminant should be regulated. The World Health Organization (WHO) has established a provisional health-based drinking water guideline of 1.0 µg/L for the algal toxin Microcystin-LR based on a lifetime exposure for adults. WHO has not established drinking water guidelines for other algal toxins. The Ohio Department of Health (ODH) and Ohio EPA developed thresholds for drinking water and recreational use, which are the basis for this policy. Should U.S. EPA establish a drinking water standard or develop other guidance regarding microcystin or other algal toxins in the future, this policy will be reviewed and revised as appropriate.

In the event that an algal toxin is detected in finished waters, this document outlines the actions Ohio EPA staff should take and provides a recommended course of action for public water systems. General information about harmful algal blooms (HABs) can be found at ***www.ohioalgaeinfo.com***. Information specific for public water system operators can be found at ***www.epa.ohio.gov/ddagw/HAB.aspx***.

III. APPLICABLE REGULATIONS AND GUIDANCE

Ohio Revised Code § 6109.12: Public Water System Analysis

Ohio Administrative Code (OAC) rule 3745-81-32: Public Notification

Ohio EPA policy WQ-07-002: Tier 1 Public Notification Requirements

World Health Organization, 1999. Toxic Cyanobacteria in Water: A Guide to their Public Health Consequences, Monitoring and Management. Geneva. (***www.who.int/water_sanitation_health/resourcesquality/toxicyanbact/en/***)

Global Water Research Coalition, 2009. International Guidance Manual for the Management of Toxic Cyanobateria. London.

Water Quality Research Australia (WQRA), 2009. Management Strategies for Cyanobacteria (Blue-Green Algae): A Guide for Water Utilities. WQRA research report 74. (***www.wqra.com.au/publications/report74_management_strategies_BGA.pdf***)

IV. POLICY

A. General Policies and Procedures

Encouragement of Voluntary Monitoring
Ohio public water systems (PWS) experiencing algal blooms are encouraged to coordinate or conduct finished water sampling to augment the Inland Lakes Program sampling, as well as, develop their own reservoir monitoring program if not already in place. Ohio EPA may recommend the PWS perform ongoing raw and finished water monitoring based on raw water results.

Toxins Addressed by this Policy
The term "microcystin" will refer to all forms of the microcystin algal toxin, including microcystin-LR, microcystin-YR, and other variants. Other algal toxins addressed by this policy include anatoxin-a, saxitoxin and cylindrospermopsin.

Testing Methods
There are a number of testing options available for algal toxins. Ohio EPA currently accepts the ELISA method for analysis of raw and finished drinking water for microcystin, saxitoxin and cylindrospermopsin. For anatoxin-a, Ohio EPA uses Liquid Chromatography-Mass Spectrometry (LC/MS), Liquid Chromatography-Tandem Mass Spectrometry(LC/MS/MS) or high-performance liquid chromatography Photo Diode Array (HPLC-PDA). There are other analytical methods that may be deemed acceptable by the Ohio EPA. PWSs considering use of other methods should contact the PWS HAB Coordinator in the Division of

Drinking and Ground Waters. Commercially available test kits can also be used for screening purposes.

Data Reporting
Ohio EPA requests PWS submit all raw and finished water monitoring results for algal toxins to the PWS HAB Coordinator in DDAGW.

Thresholds
Drinking water health advisories in this guidance have been developed by ODH and Ohio EPA. The actions described in this policy will be taken when one or more thresholds below are exceeded in a finished water sample, along with the presence of an algal bloom that has the potential to produce toxins.

Threshold (µg/L)	Microcystin**	Anatoxin-a	Cylindro-spermopsin	Saxitoxin**
Recreation – Public Health Advisory	6	80	5	0.8
Recreation – No Contact Advisory*	20	300	20	3
Drinking – Do Not Drink	1	20	1	0.2

* Recreation – No Contact Advisory thresholds are also used as Drinking – Do Not Use thresholds.
** Microcystin and saxitoxin thresholds are intended to be applied to total concentrations of all reported congeners of those toxins.

Confirmatory Analysis and Sampling
Ohio EPA will repeat analysis of any sample that exceeds a threshold, and may, on a case by case basis, coordinate with the PWS for collection of a confirmation sample, before taking the actions described in this policy.

Alternative Water Supply
In the event a public notification is required with use restrictions for any population, the public water system is encouraged to provide a supply of alternate emergency water for their consumers.

Consumer Confidence Report
As a baseline public notification measure, community public water systems are encouraged to reference finished water algal toxin detections above the threshold levels in the annual Consumer Confidence Report, with the exception of the results of field screening tests.

Notification of State Personnel
The PWS HAB Coordinator will notify the Chief of the Division of Drinking and Ground Waters (DDAGW), the Manager of the DDAGW Compliance Assurance Section, and the DDAGW District Office Drinking Water Program Manager of any initial finished water detection. The Ohio EPA Director's Office will also be notified of

any situation where public notification will be issued. In the event of a DO NOT DRINK or DO NOT USE public notice, Ohio EPA will also coordinate with the local and state emergency management agencies. All correspondence between Ohio EPA and the PWS regarding case-specific public notifications requirements will be provided to ODH and the local health department.

B. Case-Specific Procedures for Public Notification

Ohio EPA, in consultation with ODH, will determine appropriate public notification requirements, including health effects language and use restrictions, on a case-by-case basis. General guidelines for these determinations are outlined below. Duration of the contamination event may be considered in the determination of any recommended use restrictions. Public notification will be required under the authority of OAC rule 3745-81-32 and must be conducted in accordance with the provisions contained in the rule.

Tier 1 Public Notice Use Restrictions	Toxin Level (µg/L)			
	Microcystin	Anatoxin-a	Cylindro-spermopsin	Saxitoxin
DO NOT DRINK WARNING	1 - 20	20 - 300	1 - 20	0.2 - 3
DO NOT USE WARNING	> 20	> 300	> 20	> 3

If public notification is required, the PWS HAB Coordinator will coordinate with the DDAGW district office, call the PWS operator of record and send a letter requiring them to issue immediate, Tier 1 public notice informing all customers of the situation. A public notice template will be provided containing the appropriate health effects language and use restrictions. Ohio EPA may also issue a news release.

The use restrictions may be modified when toxin levels for two consecutive samples collected at least twenty-four hours apart indicate the modification is appropriate. This change will require additional public notification. The PWS HAB Coordinator will work with Ohio EPA central and district office management, ODH and the PWS as to the timing and wording of the additional public notice.

The PWS may end issuance of public notification when the algal toxin levels are below the drinking water thresholds in two consecutive samples collected a minimum of 24 hours apart.

V. HISTORY

The Division of Drinking and Ground Waters first issued this policy on June 23, 2011.

Attachment A: Public notice template for microcystin in finished water (DO NOT DRINK)

DRINKING WATER WARNING

Algal toxins are present in [name] water system

DO NOT DRINK THE WATER

Toxins from harmful algal blooms were recently found in our treated water supply. A sample collected on [date] shows microcystin toxin at [level] µg/L. The Ohio Environmental Protection Agency recommends that you do not drink the water at microcystin levels above 1 µg/L.

What should I do?

- **DO NOT DRINK THE WATER. Alternative water should be used for drinking, making infant formula, making ice, brushing teeth, and preparing food. Pets should not drink the water.**

- Healthy adults may use the water for bathing, washing hands, washing dishes and doing laundry. Special attention may be needed when bathing children to prevent ingestion. The water may be used for flushing toilets. Skin irritation, such as a rash may occur from exposure when bathing and washing hands. Providing a final rinse of skin with uncontaminated water is recommended.

- **Do not boil the water.** Boiling the water will not destroy toxins. Some toxins may become more dangerous as a result of boiling.

- Consuming water containing algal toxins may result in abnormal liver function, diarrhea, vomiting, nausea, numbness or dizziness. Seek medical attention if you feel you have been exposed to algal toxins and are having adverse health effects. Skin contact with contaminated water can cause irritation or rashes. Contact a veterinarian immediately if pets or livestock show signs of illness.

What happened? What is being done?

[Lake name], which is a source of drinking water for the [public water system] is experiencing a harmful algal bloom (HAB). These organisms are capable of producing a number of toxins that may pose a risk to human and animal health. HABs occur when excess nitrogen and phosphorus are present in lakes and streams. Such nutrients can come from runoff of over-fertilized fields and lawns, from malfunctioning septic systems and from livestock pens.

Additional monitoring is being conducted, and we will let you know when the situation has been resolved or if additional precautions should be taken. The water system is [describe what is being done]. We are working closely with [insert partners] to minimize any potential harm.

For more information, please contact _____at_____.
Additional information about harmful algal blooms can be found at ***www.ohioalgaeinfo.com***.

If you believe you or your children have been exposed to algal toxins and are experiencing adverse health effects, you should seek medical attention. After contacting medical personnel, individuals are also encouraged to report human health concerns to your local health department, [Insert local health department name] at [Insert telephone number].

Please share this information with all the other people who drink this water, especially those who may not have received this notice directly (for example, people in apartments, nursing homes, schools and businesses). You can do this by posting this notice in a public place or distributing copies by hand or mail.

PWSID#: _____ STUID#: _____ Date distributed: _____

Attachment B: Public notice template for microcystin in finished water (DO NOT USE)

DRINKING WATER WARNING

Algal toxins are present in [name] water system

DO NOT USE THE WATER

Toxins from harmful algal blooms were recently found in our treated water supply. A sample collected on [date] shows microcystin toxin at [level] µg/L. The Ohio Environmental Protection Agency recommends that you do not use the water at microcystin levels above 20 µg/L.

What should I do?

- **DO NOT USE THE WATER. Alternative water should be used for drinking (including pets), making infant formula, making ice, brushing teeth, preparing food, bathing/showering, washing hands, washing dishes or doing laundry.** If an alternate source of water is not available for washing dishes or doing laundry, providing a final rinse with uncontaminated water is recommended. If people or pets come into contact with water, promptly shower or rinse off in uncontaminated water. Skin irritation, such as a rash may occur from exposure when bathing and washing hands.

- **DO NOT BOIL THE WATER.** Boiling the water will not destroy toxins. Some toxins may become more dangerous as a result of boiling.

- You may use the water for flushing toilets.

- Consuming water containing algal toxins may result in abnormal liver function, diarrhea, vomiting, nausea, numbness or dizziness. Seek medical attention if you feel you have been exposed to algal toxins and are having adverse health effects. Skin contact with contaminated water can cause irritation or rashes. Algal toxins may pose a special health risk for young children, pregnant women, people with compromised immune systems, medically fragile individuals and pets. Contact a veterinarian immediately if pets or livestock show signs of illness.

What happened? What is being done?

[Lake name], which is a source of drinking water for the [public water system], is experiencing a harmful algal bloom (HAB). These organisms may produce a number of toxins that may pose a risk to human and animal health. HABs occur when excess nitrogen and phosphorus are present in lakes and streams. Such nutrients can come from runoff of over-fertilized fields and lawns, from malfunctioning septic systems and from livestock pens.

Additional monitoring is being conducted, and we will let you know when the situation has been resolved or if additional precautions should be taken. The water system is [describe what is being done]. We are working closely with [insert partners] to minimize any potential harm.

For more information, please contact _____at_____.
Additional information about harmful algal blooms can be found at ***www.ohioalgaeinfo.com***.

If you believe you or your children have been exposed to algal toxins and are experiencing adverse health effects, you should seek medical attention. After contacting medical personnel, individuals are also encouraged to report human health concerns to your local health department, [Insert health department name] at [Insert telephone number].

Please share this information with all the other people who drink this water, especially those who may not have received this notice directly (for example, people in apartments, nursing homes, schools and businesses). You can do this by posting this notice in a public place or distributing copies by hand or mail.

PWSID#: _____ STUID#: _____ Date distributed:_____

APPENDIX B -
LABORATORIES USED
BY THE STATE OF OHIO

Ohio EPA makes no recommendation on the use of any laboratory.
There are other laboratories that may perform algal toxin and phytoplankton analysis.
Any laboratory selected must use the protocol outlined in the Strategy or other method approved by Ohio EPA.

Algal Toxin Analysis Options

Due to increased demand, additional labs may be adding algal toxin analytical services and this list should not be considered complete. This list represents facilities that the agency has worked with or consulted with recently. Ohio EPA does not endorse or recommend any commercial laboratories or products.

For microcystin, cylindrospermopsin, saxitoxin, and phytoplankton analysis:

Ohio EPA-Division of Environmental Services (DES)
Attention: Kristin Sowards, DES Sample Coordinator
8955 E. Main St.
Reynoldsburg, OH 43068
(614) 644-4243

For anatoxin-a:

GreenWater Laboratories/Cyano Lab
205 Zeagler Dr., Suite 302
Palatka, FL 32177
(386) 328-0882

For euglenophycin:

Paul V. Zimba, Ph.D.
Director, Center for Coastal Studies
Texas A&M University-Corpus Christi
6300 Ocean Drive, Unit 5866
NRC Building 3200
Corpus Christi, TX 78412
361-825-2768
fax: 361-825-2770

For phytoplankton (genus and species identification and quantification), microcystin, and cylindrospermopsin (DSW Lake Sampling):

BSA Environmental Services, Inc.
23400 Mercantile Road
Suite 8
Beachwood, OH 44122
Email: ***j.beaver@bsaenv.com***
Telephone: (216) 765-0582
Fax: (216) 765-0583

For microcystin:

T. Mike Sudman Jr.
Supt. of Water & Distr.
Celina Utilities - Water Dept.

714 S. Sugar Street
Celina, Ohio 45822
Phone (419)586-2270
Cell (419) 733-4112
cwtpsupt@bright.net
Fax (419) 586-3598

For various cyanotoxins:

Dr. Judy Westrick
Lake Superior State University
318 Crawford Hall
650 W. Easterday Ave.
Sault Ste. Marie, MI 49783
Phone (906) 635-2165
jwestrick@lssu.edu
www.lssu.edu/academics/stem/eal/services.php

APPENDIX C -
FORMS

Note:
If you are reporting a potential harmful algal bloom to the HAB coordinator and/or submitting phytoplankton and/or algal toxin samples to a laboratory for analysis, the HAB Report Form should be e-mailed to: ***HABMailbox@epa.ohio.gov***

The HAB Report Form may be accessed at: ***ohioalgaeinfo.com***

The Inorganic Sample Submission Form and the Laboratory Chain of Custody Report must both be completed and submitted with samples sent to DES for processing. You can copy each form from this appendix and submit them with your samples. Be sure to keep a copy for yourself.

Bloom Report Form

Please provide information about the potential blue-green algae bloom observed. Information can be entered into this electronic form and saved on your computer using Word or Adobe Reader (version 9+).
Please save and email a completed copy of this form to HABmailbox@epa.state.oh.us.
You are encouraged to include digital photographs as additional email attachments (close-up, and landscape showing extent and location of bloom). If possible, consider including an image from an online mapping application such as Google, Bing or Yahoo Maps, with a marker at the bloom location. For more information go to the ohioalgaeinfo.com website.

Bloom Location:

Water body:	Date bloom observed: / /
County (optional):	Drinking water source? Yes ☐ No ☐ Unknown ☐
Publicly Owned Lake? Yes ☐ No ☐ Unknown ☐	Attached map with bloom location noted (e.g. Google Map image)? Yes ☐ No ☐ Digital photos attached? Yes ☐ No ☐

Report Completed By:

Name:	Organization:	
Title:	Phone: ( ) - ext.	Email:

Bloom Description and Sampling Information:

Please describe the location of the bloom in the water body (e.g. center of lake, at the boat dock, at the beach):

Do you notice any colors in the water column? Yes ☐ No ☐

Please check any colors you see, or describe the color(s) below: Green ☐ Blue ☐ Red ☐ Rust ☐ Brown ☐ Milky White ☐ Purple ☐ Black ☐

Please estimate the size (sq. feet) or the extent of bloom:

Can you see a surface scum (an accumulation at the surface) or algae floating near the water surface?
Algae floating at the surface can look like grass clippings, green cottage cheese curds, or spilled paint. Yes ☐ No ☐ Uncertain ☐

Is the bloom near a public beach? If yes, please specify the beach name or location below. Yes ☐ No ☐ Unknown ☐

Is the bloom near a drinking water intake? (Specify water system name if known) Yes ☐ No ☐ Unknown ☐

Were samples taken? Yes ☐ No ☐
If yes, what type of samples; when and where were they collected; and where were they sent for analysis?

Do you know if other water quality information is available? (Specify what data is available and where) Yes ☐ No ☐

OhioEPA *Division of Environmental Services*

Inorganic Sample Submission Form

DW Certification #4105

DES Use Only

Sample #_____

MM DD YY

Date Received ____/____/____

Sample Information (INSTRUCTIONS ON BACK)

Client (Bill to) _____

Project Identity _____

(project identity **requires prior approval**)

No Folder ○

Division(check one)

DAPC	○
DDAGW	○
DERR	○
DHWM	○
DSW	○
DSIWM	○
Other	_____

OEPA District(check one)

CO	○
CDO	○
NEDO	○
NWDO	○
SEDO	○
SWDO	○
Other	_____

Sample Type(check one)

Ambient	○
Complaint	○
Compliance	○
Litigation	○
Survey	○
Raw	○
Plant	○ DW only
Distribution	○
Other	_____

Matrix(check one)

Air Filter	○
Drinking water	○
Ground water	○
Sediment	○
Surface water	○
Waste water	○
Reagent Water	○
Other	_____

Collection Date MM DD YY HH MM

Grab ○ ____/____/____ ____/____

(or)

Composite ○ Begin ____/____/____ ____/____

End ____/____/____ ____/____

Frequency & Duration of Composite Sample:

Container Information

Qty.	Type	Pres.
	Air Filter	
	Cubitainer	NaOH
	Cubitainer	HNO_3
	Cubitainer	HNO_3_Filt
	Cubitainer	H_2SO_4
	Cubitainer	H_2SO_4_Filt
	Cubitainer	N/P
	Cubitainer	N/P_Filt
	Jar	H_2SO_4_Phenol
	Jar	H_2SO_4_O&G
	Sed	Frozen
	Sed	
	Bacteria	Sterile

Field QC (Check one)

Field Duplicate	○
Field/Equip/Acid Blank	○
MSD	○

Collected By _____

Customer ID # _____

Station ID # _____

Sample Location

County:

Parameters

Template _____

Demand

- ○ ------ % Solids, *Sed only*
- ○ ------ BOD-20 day
- ○ ------ BOD-5 day
- ○ ------ CBOD-20 day
- ○ ------ CBOD-5 day
- ○ ------ Oil&Grease
- ○ ------ Particle Size, *Sed only*
- ○ ------ pH
- ○ ------ Solids_Diss(filt)
- ○ ------ Solids_Suspd(nonfilt)
- ○ ------ Solids_Total
- ○ ------ Solids_Total Volatile
- ○ ------ TOC

Nutrients

- ○ ------ Acidity,Total $CaCO_3$
- ○ ------ AlkalinityTotal $CaCO_3$
- ○ ------ Ammonia
- ○ ------ Bicarbonate
- ○ ------ Chloride
- ○ ------ COD
- ○ ------ Conductivity
- ○ ------ Cyanide_Free (WAD)
- ○ ------ Cyanide_Total
- ○ ------ Fluoride
- ○ ------ Nitrite
- ○ ------ Nitrate+nitrite
- ○ ------ Orthophosphate, Dissolved
- ○ ------ Phenolics, Total w/man dist.
- ○ ------ Phosphorus, Dissolved (Filt)
- ○ ------ Phosphorous, Total
- ○ ------ Sulfate
- ○ ------ TKN

Microbiology

- ○ ------ E. coli
- ○ ------ Fecal Coliform
- ○ ------ Fecal Streptococcus
- ○ ------ MMO-MUG

Misc.

- ○ ------ Turbidity
- ○ ------ Chlorophyll_a (see back #5)
- ○ ------ _____
- ○ ------ _____

Metals (Please select one ICP AND one ICPMS package if needed)

- ○ ------ **ICP 1**, *Water only*(Al,Ba,Ca,Fe,Mg,Mn,Na,K,Sr,Zn,Hardness)
- ○ ------ **ICP 2**, *Water only*(Ca,Mg,Hardness)
- ○ ------ **ICP 3**, *Sediment only*(Al,Ba,Ca,Fe,Mg,Mn,Na,K,Sr,Zn)
- ○ ------ **ICP 4**, *SW846 only*(Al,Ba,Ca,Fe,Mg,Mn,Na,K,Sr,Zn,V,Ti,Hardness)
- ○ ------ **ICP 5**, *SW846 SED only*(Al,Ba,Ca,Fe,Mg,Mn,Na,K,Sr,Zn,V,Ti)
- ○ ------ **ICP 6**, *Air Filters only*(Zn,Mn)

- ○ ------ **ICPMS 1**, *Water only*(As,Cd,Cr,Cu,Ni,Pb,Se)
- ○ ------ **ICPMS 2**, *Sediment only*(As,Cd,Cr,Cu,Ni,Pb,Se)
- ○ ------ **ICPMS 3**, *Air Filter only*(As,Cd,Cr,Ni,Pb,Be)
- ○ ------ **ICPMS 4**, *SW846 Water* only (As,Be,Cd,Co,Cr,Cu,Ni,Pb,Se)
- ○ ------ **ICPMS 5**, *SW846 Sediment* only (As,Be,Cd,Co,Cr,Cu,Ni,Pb,Se)

Single element metals - please list only if NOT using Metals packages

- ○ ------ Antimony
- ○ ------ Beryllium
- ○ ------ Cobalt
- ○ ------ Silver
- ○ ------ _____
- ○ ------ _____
- ○ ------ Thallium
- ○ ------ Tin
- ○ ------ Titanium
- ○ ------ Vanadium
- ○ ------ _____
- ○ ------ _____

○ ------ **SW846 (Check this box if single elements require SW846 method)**

The following require prior notification to DES before submittal:

- ○ ------ Mercury
- ○ ------ Chromium, Hexavalent (N/P_Filt)

Other tests are available; please check current price list

Field Comments

Lab Comments

Chlorine,mg/l	Cond,umho/cm	DO,mg/l	ORP	Flow,cfs	Gage Ht, ft	pH, su	% Sat	Temp,oC	TDS	Corr.Cond, umho/cm
P50060	P94	P299		P61	P65	P400		P10		P94

EPA 4709 (1/08) White-Original(DES) Green-DES Yellow-Field Records

Remove yellow copy of form for your records prior to submitting form to DES

All Rush Samples require prior approval

Example -

Ohio EPA

Division of Environmental Services

Inorganic Sample Submission Form (Fill in *)

DW Certification #4105

DES Use Only

Sample # _____

MM DD YY

Date Received ___/___/___

Sample Information (INSTRUCTIONS ON BACK)

Client (Bill to) _____

Project Identity _____

(project identity **requires prior approval**)

No Folder ○

Division(check one)

DAPC	○
DDAGW	○
DERR	○
DHWM	○
DSW	○
DSIWM	○
Other	○

OEPA District(check one)

CO	○
CDO	○
NEDO	○
NWDO	○
SEDO	○
SWDO	○
Other	○

Sample Type(check one)

Ambient	○
Complaint	○
Compliance	○
Litigation	○
Survey	○
Raw	○
Plant	○
Distribution	○
Other	○

DW only

Matrix(check one)

Air Filter	○
Drinking water	○
Ground water	○
Sediment	○
Surface water	○
Waste water	○
Reagent Water	○
Other	○

Collection Date MM DD YY HH MM

* Grab ○ (or) Composite ○ Begin ___/___/___ ___/___

End ___/___/___ ___/___

Military time

Frequency & Duration of Composite Sample:

Container Information

Qty.	Type	Pres.
	Air Filter	
	Cubitainer	NaOH
	Cubitainer	HNO_3
	Cubitainer	HNO_3 Filt
	Cubitainer	H_2SO_4
	Cubitainer	H_2SO_4 Filt
*	Cubitainer	N/P
	Cubitainer	N/P_Filt
	Jar	H_2SO_4 Phenol
	Jar	H_2SO_4 O&G
	Sed	Frozen
	Sed	
	Bacteria	Sterile
* 1	Vial	Stx

Field QC (Check one)

Field Duplicate	○
Field/Equip/Acid Blank	○
MSD	○

* **Collected By** _____

* **Customer ID #** _____

see lists & links in Ohio HAB Response Strategy

* **Station ID #** _____

Sample Location

County:

* Site Name / Lake L-1

must match Container or vial

Parameters

Template _____

Demand

- ○ ------ % Solids, *Sed only*
- ○ ------ BOD-20 day
- ○ ------ BOD-5 day
- ○ ------ CBOD-20 day
- ○ ------ CBOD-5 day
- ○ ------ Oil&Grease
- ○ ------ Particle Size, *Sed only*
- ○ ------ pH
- ○ ------ Solids_Diss(filt)
- ○ ------ Solids_Suspd(nonfilt)
- ○ ------ Solids_Total
- ○ ------ Solids_Total Volatile
- ○ ------ TOC

Nutrients

- ○ ------ Acidity,Total $CaCO_3$
- ○ ------ AlkalinityTotal $CaCO_3$
- ○ ------ Ammonia
- ○ ------ Bicarbonate
- ○ ------ Chloride
- ○ ------ COD
- ○ ------ Conductivity
- ○ ------ Cyanide_Free (WAD)
- ○ ------ Cyanide_Total
- ○ ------ Fluoride
- ○ ------ Nitrite
- ○ ------ Nitrate+nitrite
- ○ ------ Orthophosphate, Dissolved
- ○ ------ Phenolics, Total w/man dist.
- ○ ------ Phosphorus, Dissolved (Filt)
- ○ ------ Phosphorous, Total
- ○ ------ Sulfate
- ○ ------ TKN

Microbiology

- ○ ------ E. coli
- ○ ------ Fecal Coliform
- ○ ------ Fecal Streptococcus
- ○ ------ MMO-MUG

Misc.

- ○ ------ Turbidity
- ○ ------ Chlorophyll_a (see back #5)
- ○ ------ _____
- ○ ------ _____

* ○ microcystin ○ CTN ○ stx

* ○ Phytoplankton *

Metals (Please select one ICP AND one ICPMS package if needed)

- ○ ------ **ICP 1**, *Water only*(Al,Ba,Ca,Fe,Mg,Mn,Na,K,Sr,Zn,Hardness)
- ○ ------ **ICP 2**, *Water only*(Ca,Mg,Hardness)
- ○ ------ **ICP 3**, *Sediment only*(Al,Ba,Ca,Fe,Mg,Mn,Na,K,Sr,Zn)
- ○ ------ **ICP 4**, *SW846 only*(Al,Ba,Ca,Fe,Mg,Mn,Na,K,Sr,Zn,V,Ti,Hardness)
- ○ ------ **ICP 5**, *SW846 SED only*(Al,Ba,Ca,Fe,Mg,Mn,Na,K,Sr,Zn,V,Ti)
- ○ ------ **ICP 6**, *Air Filters only*(Zn,Mn)

- ○ ------ **ICPMS 1**, *Water only*(As,Cd,Cr,Cu,Ni,Pb,Se)
- ○ ------ **ICPMS 2**, *Sediment only*(As,Cd,Cr,Cu,Ni,Pb,Se)
- ○ ------ **ICPMS 3**, *Air Filter only*(As,Cd,Cr,Ni,Pb,Be)
- ○ ------ **ICPMS 4**, *SW846 Water* only (As,Be,Cd,Co,Cr,Cu,Ni,Pb,Se)
- ○ ------ **ICPMS 5**, *SW846 Sediment* only (As,Be,Cd,Co,Cr,Cu,Ni,Pb,Se)

Single element metals - please list only if NOT using Metals packages

- ○ ------ Antimony
- ○ ------ Beryllium
- ○ ------ Cobalt
- ○ ------ Silver
- ○ ------ _____
- ○ ------ _____
- ○ ------ Thallium
- ○ ------ Tin
- ○ ------ Titanium
- ○ ------ Vanadium
- ○ ------ _____
- ○ ------ _____

○ ------ **SW846 (Check this box if single elements require SW846 method)**

The following require prior notification to DES before submittal:

- ○ ------ Mercury
- ○ ------ Chromium, Hexavalent (N/P_Filt)

Other tests are available; please check current price list

Field Comments

* Info as needed

* Scum? Yes Scum No Scum

Chlorine,mg/l	Cond,umho/cm	DO,mg/l	ORP	Flow,cfs	Gage Ht, ft	pH, su	% Sat	Temp,oC	TDS	Corr.Cond, umho/cm
P50060	P94	P299		P61	P65	P400		P10		P94

Lab Comments

Lab use only

EPA 4709 (1/08) White-Original(DES) Green-DES Yellow-Field Records

Remove yellow copy of form for your records prior to submitting form to DES

Division of Environmental Services

Chemistry Laboratory Chain of Custody Report

Date Received (Lab use only) Year Month Day

Collected by *_____

Ohio EPA Districts ☐ NEDO ☐ SWDO ☐ CO ☐ Other ☐ SEDO ☐ NWDO ☐ CDO

Division ☐ DSW ☐ DERR ☐ DDAGW ☐ DSIWM ☐ DAPC ☐ Other

Date of Grab Sample — Y Y M M D D

Beginning and End Date of Composite Sample

Laboratory Number(s) (Lab use only) _____

Location(s) _____

Q.C. - Field Samples # ☐ Trip Blank (organics only) # ☐ Field Bank # ☐ Duplicate

Sample Type(s) ☐ Compliance ☐ Ambient ☐ Survey ☐ Complaint ☐ Possible Legal Action ☐ With Bioassay ☐ Organic(s)

Additional Information/Comments _____

Condition of Container of Transfer: (Seal all containers) _____ Locked or Tamper Proof _____ Unlocked or Not Tamper Proof _____ Initial

Number of Samples (Containers/Sites) _____

Relinquished by _____ (must be collector*)

Received by _____

Relinquished by _____

Received by _____

Relinquished by _____

Received by _____

Relinquished by _____

Received by _____

MILITARY TIME

Year		Month		Day		Hour		Minute	

EPA 4705

Printed on Recycled Paper

Distribution
White-Laboratory
Canary-Originator-After Lab Signature
Pink-Q.A.
Goldenrod-Q.A.

Example

Division of Environmental Services

Chemistry Laboratory Chain of Custody Report

(Fill in *)

Date Received (Lab use only) — Year | Month | Day

* Collected by * _____

* Ohio EPA Districts ☐ NEDO ☐ SWDO ☐ CO ☐ Other ☐ SEDO ☐ NWDO ☐ CDO

* Division ☐ DSW ☐ DERR ☐ DDAGW ☐ DSIWM ☐ DAPC ☐ Other _____

* Date of Grab Sample — Y Y M M D D

Beginning and End Date of Composite Sample

Laboratory Number(s) (Lab use only) _____

* Location(s) _____

* Q.C. - Field Samples If needed # ☐ Trip Blank (organics only) # ☐ Field Bank # ☐ Duplicate

* Sample Type(s) ☐ Compliance ☐ Ambient ☐ Organic(s) ☐ Survey ☐ Complaint ☐ Possible Legal Action ☐ With Bioassay

* Additional Information/Comments If needed _____

* Condition of Container of Transfer: (Seal all containers) _____ Locked or Tamper Proof _____ Unlocked or Not Tamper Proof _____ Initial

* Number of Samples (Containers/Sites) _____

* Relinquished by * must match (must be collector*)

Received by ↳ as needed

Relinquished by ↳

Received by _____

Relinquished by _____

Received by _____

Relinquished by _____

Received by _____

MILITARY TIME

*	Year	Month	Day	Hour	Minute

EPA 4705
Printed on Recycled Paper

Distribution
White-Laboratory
Canary-Originator-After Lab Signature
Pink-Q.A.
Goldenrod-Q.A.

Copy will be sent after S.C.

APPENDIX D -
STATION IDS (FOR PWS USE)
AND OHIO PWS LAKES

Ohio EPA Harmful Algal Bloom Project - Public Water System Sampling Points

TP - Treatment Plant; EP - Entry Point (finished); RS - Reservoir; IN - Intake; RW - Raw Water

Use Station Code to identify site where sample was taken.

Station Code	Station Name
CDO	
Delaware	
IN21610-RS004	Delaware Olentangy North Intake RS004-RW
IN21611-RS005	Delaware Olentangy South Intake RS005-RW
TP2720-EP001	Delaware WTP EP001-EP
TP2727-EP002	DEL-CO Re Scott WTP (Alum Ck) EP002-EP
TP2727-RS016	DEL-CO Re Scott WTP (Alum Ck) RS016-RW
TP2727-RS017	DEL-CO Re Scott WTP (Alum Ck) RS017-RW
TP2729-EP004	DEL-CO TF McNamara WTF (Old State) EP004-EP
IN21812-RS011	DEL-CO Alum Creek Reservoir Intake RS011-RW
TP2728-EP003	DEL-CO East Knox WTP EP003-EP
IN21807-RS010	DEL-CO McNamara Reservoir 1 Intake RS010-RW
RS38490	DEL-CO McNamara Reservoir 2
IN21609-RS001	DEL-CO Olentangy Reservoir 1 RS001-RW
RS38491	DEL-CO Olentangy Reservoir 2
IN21609-RS002	DEL-CO Olentangy Reservoir 2 RS002-RW
RS38492	DEL-CO Olentangy Reservoir 3
IN21609-RS003	DEL-CO Olentangy Reservoir 3 RS003-RW
RS38493	DEL-CO Olentangy Reservoir 4
IN21609-RS004	DEL-CO Olentangy Reservoir 4 RS004-RW
IN21608-RS005	DEL-CO Olentangy River Intake RS005-RW
TP2730-EP001	DEL-CO Olentangy WTP EP001-EP
Fayette	
IN21604-RS001	Washington Court House Paint Creek Intake RS001-RW
TP2939-EP001	Washington Court House PWS EP001-EP
IN21602	Washington Court House Reservoir Intake
IN21603-RS002	Washington Court House Reservoir Intake RS002-RW

Franklin

IN21629-RS001	Columbus Dublin Road Scioto River Intake RS001-RW
TP3005-EP001	Columbus Dublin Road WTP EP001-EP
IN21814-RS003	Columbus Hap Cremean Alum Creek Intake RS003-RW
IN21813-RS007	Columbus Hap Cremean Big Walnut Intake RS007-RW
IN21815-RS002	Columbus Hap Cremean Hoover Reservoir Intake RS002-RW
TP3007-EP002	Columbus Hap Cremean Plant EP002-EP
TP3006-EP003	Columbus Parsons Ave Water Plant EP003-EP
IN21630-RS001	Westerville Alum Creek Intake RS001-RW
TP2997-EP001	Westerville WTP EP001-EP

Licking

IN21580-RS002	Newark North Fork Licking Reservoir Intake RS002-RW
TP4575-EP001	Newark WTP EP001-EP

Union

IN21805-RS001	Marysville Mill Creek Intake RS001-RW
TP8743-EP001	Marysville WTP EP001-EP

NEDO

Ashtabula

IN21537-RS001	Conneaut Lake Erie Intake RS001-RW
TP1565-EP001	Conneaut WTP EP001-EP
IN21538-RS001	Ohio American Ashtabula Lake Erie Intake RS001-RW
TP1568-EP001	Ohio American Ashtabula WTP EP001-EP

Carroll

IN21618-RSSW1	MWCD Atwood Park Atwood Lake Intake RSSW1-RW
TP1896-EP001	MWCD Atwood Park EP001-EP
IN21617-RSSW1	MWCD Atwood Resort Atwood Lake 1 Intake RSSW1-RW
TP1895-EP001	MWCD Atwood Resort EP001-EP

Columbiana

TP36705-EP001	Buckeye Water District - Ohio River EP001-EP
TP36705-LT2001	Buckeye Water District - Ohio River LT2001-RW
IN21563-RS001	Buckeye Water District Wellsville Reservoir Intake RS001-RW
IN21688-RSSW1	East Liverpool Ohio River Intake RSSW1-RW
TP2206-EP001	East Liverpool WTP EP001-EP
IN21559-RSSW2	Salem Cold Run Creek Intake RSSW2-RW
IN21560-RSSW1	Salem Reservoir Intake RSSW1-RW
IN21558-RSSW3	Salem Sandy Beaver Reservoir Intake RSSW3-RW
TP2216-EP001	Salem WTP EP001-EP

Cuyahoga

IN21544-RS001	Berea East Branch Of Rocky River Intake RS001-RW
TP2532-EP001	Berea WTP EP001-EP
TP2543-EP002	Cleveland Crown WTP EP002-EP
IN21546-RS001	Cleveland Baldwin Lake Erie Intake RS001-RW
TP2540-EP001	Cleveland Baldwin WTP EP001-EP
IN21809-RS002	Cleveland Crown Lake Erie Intake RS002-RW
IN21810-RS003	Cleveland Morgan Lake Erie Intake RS003-RW
TP2541-EP003	Cleveland Morgan WTP EP003-EP
IN21811-RS004	Cleveland Nottingham Lake Erie Intake RS004-RW
TP2542-EP004	Cleveland Nottingham WTP EP004-EP

Lake

TP4492-EP001	Aqua Ohio Inc - Mentor EP001-EP
IN21571-RSSW1	Aqua Ohio Inc - Mentor Lake Erie Intake RSSW1-RW
IN21570-RS001	Fairport Harbor Lake Erie Intake RS001-RW
TP4488-EP001	Fairport Harbor WTP EP001-EP
TP4488-LT2001	Fairport Harbor WTP LT2001-RW
IN21606-RS001	Lake County East Subdistrict Lake Erie Intake RS001-RW
TP4497-EP001	Lake County East Subdistrict EP001-EP
IN21573-RS001	Lake County West Subdistrict Lake Erie Intake RS001-RW
TP4496-EP001	Lake County West Subdistrict WTP EP001-EP
TP4493-EP001	Painesville EP001-EP
IN21572-RSSW1	Painesville Lake Erie Intake 1 RSSW1-RW
IN35426	Painesville Lake Erie Intake 2

Lorain

IN35463	Avon Lake Lake Erie 24 Inch Intake
IN35427	Avon Lake Lake Erie 48 Inch Intake
IN21698-RSSW1	Avon Lake Lake Erie 56 Inch Intake RSSW1-RW
TP4931-EP001	Avon Lake WTP EP001-EP
TP4932-EP001	Elyria Water Department EP001-EP
IN21699-RS001	Elyria Water Department Lake Erie Intake RS001-RW
IN21699-RSSW1	Elyria Water Department Lake Erie Intake RSSW1-RW
IN21700-RSSW1	Lorain Lake Erie Intake RSSW1-RW
TP4935-EP001	Lorain WTP EP001-EP
RS38711	Oberlin Upground Reservoir
IN38790-RS001	Oberlin West Branch Black River Intake RS001-RW
IN21702-RSSW1	Oberlin West Branch Black River Reservoir Intake RSSW1-RW
TP4(937) EP001	Oberlin WTP EP001-EP
IN21781-RSSW1	Wellington Charlemont Creek Reservoir Intake RSSW1-RW
IN21780-RSSW2	Wellington Upground Reservoir Intake RSSW2-RW
TP4942-EP001	Wellington WTP EP001-EP

Mahoning

TP5144-EP001	Aqua Ohio-Struthers EP001-EP
IN21737-RSSW1	Aqua Ohio-Struthers Evans Lake Intake RSSW1-RW
TP5134-EP001	Campbell City EP001-EP
IN21787-RSSW1	Campbell City Lake Hamilton Intake RSSW1-RW
IN21786-RSSW2	Campbell City Lake McKelvey Intake RSSW2-RW
IN21738-RSSW1	Sebring Mahoning River Intake RSSW1-RW
TP5146-EP001	Sebring WTP EP001-EP
TP5146-LT2001	Sebring WTP LT2001-RW

Portage

IN119464	Akron City PWS - Lake Rockwell 72-Inch Intake
WTP7758597	Akron City WTP
TP6669-EP001	ODNR West Branch Tower EP001-EP
IN21719-RS001	ODNR West Branch Tower Reservoir Intake RS001-RW
IN21705-RS001	Ravenna Lake Hodgson Intake RS001-RW
TP6530-EP001	Ravenna WTP EP001-EP
OEPA293	Sandy Lake

Stark

IN21722-RSSW1	Alliance Deer Creek Reservoir Intake RSSW1-RW
TP7539-EP001	Alliance EP001-EP
IN35448	Alliance Mahoning River Intake
IN21721-RSSW2	Alliance Walborn Reservoir RSSW2-RW

Summit

IN37109	Akron Lake Rockwell 48 Inch Intake
IN35449	Akron Lake Rockwell 60 Inch Intake
IN21754-RSSW1	Akron Lake Rockwell 72 Inch Intake RSSW1-RW
TP7911-EP001	Akron WTP EP001-EP
IN21755-RSSW1	Barberton Wolf Creek Reservoir Intake RSSW1-RW
TP7915-EP001	Barberton WTP EP001-EP

Trumbull

IN21796-RSSW2	Mahoning Valley SD Berlin Lake Intake RSSW2-RW
IN21797-RSSW1	Mahoning Valley SD Meander Creek Reservoir Intake RSSW1-RW
TP8483-EP001	Mahoning Valley SD Meander Creek WTP EP001-EP
IN21798-RSSW1	Newton Falls East Branch Mahoning River Intake RSSW1-RW
TP8486-EP001	Newton Falls WTP EP001-EP
TP8486-LT2001	Newton Falls WTP LT2001-RW
IN21800-RSSW1	Warren Mosquito Reservoir Intake RSSW1-RW
TP8495-EP001	Warren WTP EP001-EP
TP8496-EP001	West Farmington EP001-EP
IN21801-RS001	West Farmington Grand River Intake RS001-RW

NWDO

Allen

IN34036-RS011	Delphos Little Auglaize River Intake RS011-RW
RS34101	Delphos Reservoir 1
TP34077-EP002	Delphos WTP No 2 EP002-EP
TP34077-LT2001	Delphos WTP No 2 LT2001-RW
IN21677-RSSW6	Lima Auglaize River Intake RSSW6-RW
IN21676-RSSW7	Lima Bresler Reservoir Intake RSSW7-RW
IN21675-RSSW8	Lima Ferguson Lake Reservoir Intake RSSW8-RW
IN21678-RSSW5	Lima Lost Creek Reservoir 1 RSSW5-RW
IN21681-RSSW2	Lima Metzger Reservoir Intake RSSW2-RW
IN21682-RSSW1	Lima Ottawa River At Metzger Rd Intake RSSW1-RW
IN21679-RSSW4	Lima Ottawa River At Roush Rd Intake RSSW4-RW
IN21680-RSSW3	Lima Twin Lakes Reservoir Intake RSSW3-RW
WTP252634	Lima WTP
TP1396-EP001	Lima WTP EP001-EP
OEPA231	Metzger Reservoir

Ashland

IN35487	Cinnamon Lake Utilities Cinnamon Lake Intake
IN21564-RSSW2	Cinnamon Lake Utilities Reservoir Intake RSSW2-RW
TP1470-EP001	Cinnamon Lake Utilities WTP EP001-EP

Crawford

IN21644	Bucyrus Neff Reservoir Intake
RS39512-RSS001	Bucyrus Neff Reservoir RSS001-RW
RS39326-RSS004	Bucyrus Outhwaite Reservoir RSS004-RW
RS39(513) RSS002	Bucyrus Pines Reservoir RSS002-RW
RS39327-RSS003	Bucyrus Riley Reservoir RSS003-RW
IN21645-RSS001	Bucyrus Sandusky River Intake RSS001-RW
TP2487-EP001	Bucyrus WTP EP001-EP
TP2487-RS001	Bucyrus WTP RS001-RW
IN21646-RSSW2	Galion Amicks Reservoir Intake RSSW2-RW
IN34736-RSSW3	Galion Powers Reservoir Intake RSSW3-RW
IN21647-RSSW1	Galion Rocky Fork Intake Amanns Reservoir RSSW1-RW
TP2489-EP001	Galion WTP EP001-EP
IN39514	Pines Reservoir Intake

Defiance

RS39330	Defiance City Reservoir
IN39392	Defiance Maumee River Intake 1
IN21631-RSSW1	Defiance Maumee River Intake RSSW1-RW
TP2669-EP001	Defiance WTP EP001-EP

Erie (continued on next page)

TP2772-EP001	Camp Patmos EP001-EP
IN21578-RSSW1	Camp Patmos Lake Erie Intake RSSW1-RW
TP2772-LT2001	Camp Patmos LT2001-RW
WTP2253920	Camp Patmos WTP
CPAT-FIN-1	Camp Patmos WTP
CPAT-RAW-1	Camp Patmos WTP
IN21530-RSSW1	Huron Lake Erie Intake RSSW1-RW
HUR-FIN-EP001	Huron WTP
HUR-FIN-EP	Huron WTP
HUR-RAW-1	Huron WTP
WTP2253912	Huron WTP
TP2763-EP001	Huron WTP EP001-EP
TP2763-LT2001	Huron WTP LT2001-RW
HURON_SW01R	Huron WTP Shore Well - Raw
IN21531-RSSW1	Kelleys Island Lake Erie Intake RSSW1-RW
KIW-FIN-1	Kelleys Island Vlg WTP
KIW-RAW-1	Kelleys Island Vlg WTP
WTP2253913	Kelleys Island Vlg WTP
TP2764-EP001	Kelleys Island WTP EP001-EP
IN21574-RSSW2	Sandusky - Sandusky Bay Reservoir Intake RSSW2-RW
IN21575-RSSW1	Sandusky Lake Erie Intake RSSW1-RW
SAN-RAW-L	SANDUSKY WTP
WTP2253916	Sandusky WTP
SAN-RAW-LAB	SANDUSKY WTP
SAN-FIN-301	SANDUSKY WTP
SAN-FIN-30I	SANDUSKY WTP
SAN-FIN-30IN	SANDUSKY WTP
TP2767-EP001	Sandusky WTP EP001-EP
IN21576-RSSW2	Vermilion - Vermilion River Intake RSSW2-RW

Erie (continued)

IN21577-RSSW1	Vermilion Lake Erie Intake RSSW1-RW
TP2768-EP001	Vermilion WTP EP001-EP

Fulton

IN21690-RSSW2	Archbold Brush Creek Intake RSSW2-RW
IN21689-RSSW3	Archbold North Reservoir Intake RSSW3-RW
RS36099	Archbold Reservoir 1 (76 MG)
RS36098	Archbold Reservoir 2 (220 MG)
IN21691-RSSW1	Archbold Tiffin River Intake RSSW1-RW
TP3139-EP001	Archbold WTP EP001-EP
IN21632-RSSW3	Delta 108 MG Reservoir N Intake RSSW3-RW
IN21633-RSSW2	Delta 400 MG Reservoir N Intake RSSW2-RW
IN21634-RSSW1	Delta Bad Creek Intake RSSW1-RW
RS34198	Delta Reservoir 1 (400 MG)
RS34199	Delta Reservoir 2 (108 MG)
TP32016-EP002	Delta WTP Plant 2 EP002-EP
RS34482	Swanton Reservoir
IN21535-RSSW2	Swanton Reservoir Intake RSSW2-RW
IN21536-RSSW1	Swanton Swan Creek Intake RSSW1-RW
TP3146-EP001	Swanton WTP EP001-EP
TP3146-LT2001	Swanton WTP LT2001-RW
RS36496	Wauseon Reservoir 1 (50 MG)
RS36511	Wauseon Reservoir 2 (300 MG)
IN21696-RSSW2	Wauseon 300 MG Reservoir Intake RSSW2-RW
IN21694-RSSW4	Wauseon 50 MG Reservoir Intake RSSW4-RW
IN21692	Wauseon At Napoleon Maumee River Intake
IN21697-RSSW1	Wauseon Big Ditch Creek Intake RSSW1-RW
IN21693	Wauseon Maumee River Intake
IN21695-RSSW3	Wauseon Stucky Ditch Reservoir Intake RSSW3-RW
TP3140-EP001	Wauseon WTP EP001-EP

Hancock (continued on next page)

IN35418	Findlay 1.3 Billion Gallon Reservoir To Plant Intake
IN35417	Findlay Blanchard River Intake 2
IN21586-RSSW1	Findlay Blanchard River Intake RSSW1-RW
IN21585-RSSW2	Findlay Reservoirs No 4 Intake RSSW2-RW

Hancock (continued)

RS34259	Findlay Upground Reservoir 1 (1.3 BG)
RS34260	Findlay Upground Reservoir 2 (4.5 BG)
TP3778-EP001	Findlay WTP EP001-EP
WTP7458088	Fostoria City WTP
IN21588-RSSW1	McComb Rader Creek Intake RSSW1-RW
IN21587-RSSW2	McComb Reservoirs Intake RSSW2-RW
RS39045-RS001	McComb Reservoir #1 23.5 MG RS001
RS39046-RS002	McComb Reservoir #2 RS002-RW
TP3780-EP001	McComb Stp EP001-EP
TP3780-LT2001	McComb Stp LT2001-RW

Henry

TP3985-EP001	Campbell Soup Supply Co EP001-EP
TP3985-LT2001	Campbell Soup Supply Co LT2001-RW
IN21551-RSSW1	Campbell Soup Supply Co Maumee River Intake 1 RSSW1-RW
IN35419	Campbell Soup Supply Co Maumee River Intake 2
IN21547-RSSW1	HCRW&SD - McClure Maumee River Intake RSSW1-RW
TP3977-EP001	HCRW&SD - McClure WTP EP001-EP
TP3977-LT2001	HCRW&SD - McClure WTP LT2001-RW
TP3978-EP001	Napoleon City EP001-EP
TP3978-LT2001	Napoleon City LT2001-RW
IN21550-RSSW1	Napoleon Maumee River Intake RSSW1-RW
IN21549	Napoleon New Intake For Wauseon 300 MG Reservoir
IN21548	Napoleon New Intake For Wauseon 50 MG Reservoir

Huron (continued on next page)

IN35423	Bellevue Miller / Berry Ditch Intake
IN35420	Bellevue Big Ditch Intake
TP4252-EP001	Bellevue EP001-EP
IN21643-RSSW1	Bellevue Frink Run Reservoir Intake RSSW1-RW
TP4252-LT2001	Bellevue LT2001-RW
RS34423	Bellevue Reservoir 1 (68.85 MG)
RS34425	Bellevue Reservoir 3 (75 MG)
RS34428	Bellevue Reservoir 4 (155 MG)
RS34430	Bellevue Reservoir 5 (737 MG)
IN21642-RSSW2	Bellevue Upground Reservoir 5 Intake RSSW2-RW

Huron (continued)

TP4259-EP001	Monroeville EP001-EP
IN21653-RSSW1	Monroeville Huron River Intake RSSW1-RW
IN21652	Monroeville Huron River New Intake For Reservoir
RS39396	Monroeville Reservoir
TP4259-RS001	Monroeville RS001-RW
IN21655-RSSW1	New London Plant 1 Buck Creek Intake RSSW1-RW
TP4260-EP001	New London Plant 1 EP001-EP
IN21654-RSSW2	New London Plant 1 Upground Reservoir Intake RSSW2-RW
IN21662-RS001	New London Plant 2 Buck Creek Intake RS001-RW
TP4268-EP001	New London Plant 2 EP001-EP
IN21661-RS002	New London Plant 2 Upground Reservoir Intake RS002-RW
IN21656-RSSW3	Norwalk - Huron River Intake RSSW3-RW
IN35424	Norwalk - Lower Reservoir Intake
IN21658-RSSW1	Norwalk - Norwalk Creek Intake RSSW1-RW
IN21657-RSSW2	Norwalk - Norwalk Reservoir Intake RSSW2-RW
IN35425	Norwalk - Reservoir Spillway Intake
RS34515	Norwalk Lower Reservoir
RS34514	Norwalk Memorial Reservoir
RS34513	Norwalk Upper Reservoir
TP4262-EP001	Norwalk WTP EP001-EP
TP4264-EP001	Willard EP001-EP
IN21660-RSSW1	Willard Huron River Intake RSSW1-RW
RS37180-RSS001	Willard Reservoir RSS001-RW
IN21659-RSSW2	Willard Upground Reservoir Intake RSSW2-RW

Lucas (continued on next page)

IN96930	Oregon City PWS - Lake Erie Intake
WTP4855844	Oregon City WTP
ORE-RAW-L	Oregon City WTP
ORE-RAW-1	Oregon City WTP
ORE-RIN-EP	Oregon City WTP
ORE-RAW-LOSRVC	Oregon City WTP
ORE-FIN-EP	Oregon City WTP
ORE-FIN-EP001	Oregon City WTP
TP4961-EP001	Oregon EP001-EP

Lucas (continued)

IN21782-RSSW1	Oregon Lake Erie Intake RSSW1-RW
IN21783-RS001	Toledo Lake Erie Intake RS001-RW
TOL-RAW-LOSRVC	Toledo WTP
TOL-FIN-EP	Toledo WTP
TOL- FIN-EP001	Toledo WTP
TOL-RAW-1	Toledo WTP
TOL-RAW-L	Toledo WTP
WTP4855847	Toledo WTP
TP4964-EP001	Toledo WTP EP001-EP

Marion

IN21779-RSSW1	OH AM Water Co Marion Big Scioto Intake RSSW1-RW
TP5314-EP001	Oh Am Water Co Marion EP001-EP
IN21778-RSSW2	OH AM Water Co Marion Little Scioto Intake RSSW2-RW

Mercer

IN100001	Celina City - Grand Lake Intake
WTP5456396	Celina City WTP
TP5562-EP001	Celina EP001-EP
IN21720-RS001	Celina Grand Lake Intake RS001-RW
ODNR225	Grand Lake - Celina Pizza Hut Dock

Ottawa (continued on next page)

CAR-RAW-RS001	Carroll Water and Sewer - Lake Erie Intake
TP6147-EP001	Carroll Water and Sewer EP001-EP
IN21777-RSS01	Carroll Water and Sewer Lake Erie Intake RSS01-RW
CAR-RAW-R	Carroll Water and Sewer WTP
CAR-FIN-EP	Carroll Water and Sewer WTP
WTP6256927	Carroll Water and Sewer WTP
CAR-FIN-EP001	Carroll Water and Sewer WTP
TP6125-EP001	Lake Erie Utilities Co EP001-EP
IN21765-RSSW1	Lake Erie Utilities Co Lake Erie Intake RSSW1-RW
WTP6256901	Lake Erie Utilities Co WTP
LEU-FIN-1	Lake Erie Utilities Co WTP
LEU-RAW-1	Lake Erie Utilities Co WTP
IN21767-RSSW1	Marblehead Lake Erie Intake 1 RSSW1-RW
IN32711-RSSW2	Marblehead Lake Erie Intake 2 RSSW2-RW

Ottawa (continued)

OH6202411	Marblehead WTP
MAR-RAW-L	Marblehead WTP
MAR-FIN-EP	Marblehead WTP
MAR-FIN-EP001	Marblehead WTP
MAR-RAW-LAB	Marblehead WTP
WTP6256904	Marblehead WTP
TP6127-EP001	Marblehead WTP EP001-EP
WTP6256925	Ottawa County Regional WTP
OTT-RAW-R	Ottawa County Regional WTP
OTT-FIN-EP0	Ottawa County Regional WTP
OTT-FIN-EP001	Ottawa County Regional WTP
OTT-RAW-RS001	Ottawa County Regional WTP - Lake Erie Intake
TP6146-EP001	Ottawa County Regional EP001-EP
IN21776-RSS01	Ottawa County Regional Lake Erie Intake RSS01-RW
TP6136-EP001	Put-in-Bay EP001-EP
IN21770-RSSW1	Put-In-Bay Lake Erie Intake RSSW1-RW
WTP6256913	Put-in-Bay Village WTP
PIB-FIN-1	Put-In-Bay Village WTP
PIB-RAW-1	Put-In-Bay Village WTP

Paulding

TP6312-EP001	Paulding EP001-EP
IN21747-RSSW1	Paulding Flat Rock Creek Intake RSSW1-RW
TP6312-LT2001	Paulding LT2001-RW
IN21746-RSSW2	Paulding Reservoir Intake RSSW2-RW
RS37647-RSS001	Paulding Reservoir RSS001-RW

Putnam

IN21763-RSSW1	Ottawa Blanchard River Intake RSSW1-RW
IN21762-RSSW2	Ottawa Reservoir Intake RSSW2-RW
RS36665	Ottawa Upground Reservoir (161 MG)
TP6835-EP001	Ottawa WTP EP001-EP

Richland (continued on next page)

IN21764-RSSW1	Mansfield Clear Fork River Intake RSSW1-RW
TP6925-EP001	Mansfield WTP EP001-EP
IN21774-RSSW1	Shelby Blackfork Creek Intake RSSW1-RW

Richland (continued)

IN35437	Shelby Marsh Run Intake
RS40002	Shelby Reservoir 2
RS40003	Shelby Reservoir 3
IN21773-RSSW2	Shelby Reservoir 3 Intake RSSW2-RW
TP6942-EP001	Shelby WTP EP001-EP
TP6942-LT2001	Shelby WTP LT2001-RW

Sandusky

IN21(740) RSSW3	Clyde Beaver Creek Intake RSSW3-RW
IN21739-RSSW4	Clyde Beaver Creek Reservoir Intake RSSW4-RW
WTP7257900	Clyde WTP
TP7170-EP001	Clyde WTP EP001-EP
IN21743-RSSW1	Fremont Sandusky River Intake RSSW1-RW
TP7171-EP001	Fremont WTP EP001-EP

Seneca

TP34076-EP001	Attica EP001-EP
IN21707-RSSW1	Attica Honey Creek Intake RSSW1-RW
RS34099-RES02	Attica Reservoir A Res02-RW
RS34098-RES01	Attica Reservoir B Res01-RW
IN35442	Fostoria East Branch Portage River Intake 1
IN21729-RSSW2	Fostoria East Branch Portage River Intake 2 RSSW2-RW
RS38570-RSS001	Fostoria Reservoir 1 RSS001-SR
RS38571-RSS002	Fostoria Reservoir 2 RSS002-SR
RS38572-RSS003	Fostoria Reservoir 3 RSS003-SR
RS38573-RSS004	Fostoria Reservoir 4 RSS004-SR
RS38574-RSS005	Fostoria Reservoir 5 RSS005-SR
RS38575-RSS006	Fostoria Reservoir 6 RSS006-SR
TP7357-EP001	Fostoria WTP EP001-EP
TP7357-RS001	Fostoria WTP RS001-RW
TP7359-EP001	OAWC Tiffin District EP001-EP
IN21730-RSSW1	OAWC Tiffin District Sandusky River Intake RSSW1-RW

Van Wert

TP8806-EP001	Van Wert EP001-EP
RS36504	Van Wert Reservoir 1
RS36505	Van Wert Reservoir 2
RS36506	Van Wert Reservoir 3
IN21803-RSSW1	Van Wert Town Creek Intake 1 RSSW1-RW
IN21802-RSSW2	Van Wert Town Creek Intake 2 RSSW2-RW

Wood

TP9337-EP001	Bowling Green EP001-EP
IN21795-RSSW1	Bowling Green Maumee River Intake RSSW1-RW
RS32739	Bowling Green Reservoir
IN21794-RSSW2	Bowling Green Reservoir Intake RSSW2-RW
TP9347-EP001	North Baltimore EP001-EP
RS37176	North Baltimore Reservoir 1 (100 MG)
IN21792-RSSW2	North Baltimore Reservoir 1 (100 MG) Intake RSSW2-RW
RS37177	North Baltimore Reservoir 2 (258 MG)
IN21791-RSSW3	North Baltimore Reservoir 2 (258 MG) Intake RSSW3-RW
IN21793-RSSW1	North Baltimore Rocky Ford Intake 1 RSSW1-RW
IN35450	North Baltimore Rocky Ford Intake 2

Wyandot

IN21789-RSSW1	Upper Sandusky - Sandusky River Intake 1 RSSW1-RW
IN35532	Upper Sandusky - Sandusky River Intake 2
TP9469-EP001	Upper Sandusky EP001-EP
IN21788-RSSW2	Upper Sandusky Reservoir Intake RSSW2-RW
RS38687-RSS001	Upper Sandusky Reservoir RSS001-RW

SEDO

Athens

IN21628-RS001	Burr Oak Regional Burr Oak Lake Intake RS001-RW
WTP552904	Burr Oak Regional Water District WTP
TP1662-EP001	Burr Oak Regional WTP EP001-EP

Belmont

OEPA236	Barnesville Reservoir 1
IN21581-RSSW3	Barnesville Reservoir 1 Intake RSSW3-RW
OEPA235	Barnesville Reservoir 2
IN21582-RSSW2	Barnesville Reservoir 2 Intake RSSW2-RW
IN21583-RSSW1	Barnesville Slope Creek Intake RSSW1-RW
WTP752965	Barnesville WTP
TP1724-EP001	Barnesville WTP EP001-EP
TP1724-LT2001	Barnesville WTP LT2001-RW
IN21584-RSSW1	Bellaire Infiltration RSSW1-RW
TP1725-EP001	Bellaire WTP EP001-EP
IN21592-RSSW1	Saint Clairsville Municipal Reservoir Intake RSSW1-RW
IN21591-RSSW2	Saint Clairsville Provident Reservoir Intake RSSW2-RW
TP1737-EP001	Saint Clairsville WTP EP001-EP
TP1737-LT2001	Saint Clairsville WTP LT2001-RW

Coshocton

TP2427-EP001	Echoing Hills Village EP001-EP
IN21555-RSSW2	Echoing Hills Village Lower Pond Intake RSSW2-RW
IN34388	Echoing Hills Village Shalimar Lake Intake
IN21556-RSSW1	Echoing Hills Village Upper Pond Intake RSSW1-RW

Guernsey

IN21621-RSSW1	Cambridge Wills Creek Intake RSSW1-RW
TP3684-EP001	Cambridge WTP EP001-EP

Harrison

IN21533-RS001	Cadiz Sparrow Reservoir Intake RS001-RW
IN21532-RS004	Cadiz Tappan Lake Intake RS004-RW
TP3920-EP001	Cadiz WTP EP001-EP
TP3920-LT2001	Cadiz WTP LT2001-RW

Hocking

TP4079-EP001	ODNR Hocking Hills State Park EP001-EP
IN21553-RSSW1	ODNR Hocking Hills State Park Rose Lake Intake RSSW1-RW

Jackson

IN21683-RSSW2	Jackson Jisco Lake Intake RSSW2-RW
IN31633	Jackson Buckeye Creek Intake
IN21684-RSSW1	Jackson Hammertown Lake Intake RSSW1-RW
TP4302-EP001	Jackson WTP EP001-EP
IN21686-RSSW2	Wellston North Lake Alma Intake RSSW2-RW
IN21685-RSSW3	Wellston North Lake Rupert Intake RSSW3-RW
IN21687-RSSW1	Wellston North Little Raccoon Creek Intake RSSW1-RW
IN31653	Wellston North WTP City Impoundment Intake
TP4317-EP001	Wellston North WTP EP001-EP
TP4317-LT2001	Wellston North WTP LT2001-RW
TP4318-EP002	Wellston South WTP EP002-EP
TP4318-LT2002	Wellston South WTP LT2002-RW

Jefferson

TP4342-EP001	Steubenville EP001-EP
IN21636-RSSW1	Steubenville Ohio River Intake RSSW1-RW
IN21637-RSSW1	Toronto Ohio River Intake RSSW1-RW
TP4345-EP001	Toronto WTP EP001-EP
TP4345-LT2001	Toronto WTP LT2001-RW

Lawrence

IN21623-RSSW1	Ironton Ohio River Intake RSSW1-RW
TP4544-EP001	Ironton WTP EP001-EP

Monroe

IN21732-RSSW2	Woodsfield Reservoir 1 Intake RSSW2-RW
IN21731-RSSW3	Woodsfield Reservoir 2 Intake RSSW3-RW
IN21733-RSSW1	Woodsfield Sunfish Creek Intake RSSW1-RW
WTP5656607	Woodsfield WTP
TP5805-EP001	Woodsfield WTP EP001-EP
TP5805-LT2001	Woodsfield WTP LT2001-RW

Muskingum

TP6035-EP001	Maysville Regional Water District EP001-EP
IN21758-RS001	Maysville Regional Wtr Dist Frazers Quarry Intake RS001-RW
IN21761-RSSW1	New Concord Crooked Creek Intake RSSW1-RW
IN21760-RSSW2	New Concord Reservoir Intake RSSW2-RW
IN21759-RSSW3	New Concord Upper Reservoir Intake RSSW3-RW
TP6036-EP001	New Concord WTP EP001-EP
TP6036-LT2001	New Concord WTP LT2001-RW
IN21748-RSSW1	ODNR Blue Rock State Park Cutler Lake Intake RSSW1-RW
TP6073-EP001	ODNR Blue Rock State Park EP001-EP
TP6073-LT2001	ODNR Blue Rock State Park LT2001-RW
WTP6056857	ODNR Blue Rock State Park WTP

Noble

IN21750-RSSW1	Caldwell Lake Intake RSSW1-RW
IN21749-RSSW2	Caldwell Wolf Run Lake Intake RSSW2-RW
TP6100-EP001	Caldwell WTP EP001-EP
TP6100-LT2001	Caldwell WTP LT2001-RW

Perry

IN21709-RSSW5	Crooksville Allen Reservoir Intake #4 RSSW5-RW
TP6340-EP001	Crooksville EP001-EP
TP6340-LT2001	Crooksville LT2001-RW
IN21710-RSSW4	Crooksville North Dry Run Reservoir Intake#2 RSSW4-RW
IN21713-RSSW1	Crooksville Sayre Reservoir Intake #3 RSSW1-RW
IN21711-RSSW3	Crooksville South Dry Run Reservoir Intake #1 RSSW3-RW
IN21714-RSSW3	New Lexington New Reservoir Intake RSSW3-RW
IN21716-RSSW1	New Lexington Old Reservoir Intake RSSW1-RW
TP6342-EP001	New Lexington WTP EP001-EP
TP6347-EP001	Somerset EP001-EP
IN21718-RSSW1	Somerset Lake Intake RSSW1-RW
IN21717-RSSW2	Somerset Lake St Joseph Intake RSSW2-RW
TP6347-LT2001	Somerset LT2001-RW

Pike

TP6493-EP001	United States Enrichment Portsmouth GD Plant EP001-EP
IN21728-RSSW2	United States Enrichment Scioto River Intake RSSW2-RW
IN21727-RSSW1	United States Enrichment X-611-B Reservoir Intake RSSW1-RW

Scioto

IN21704-RSSW1	Portsmouth Ohio River Intake RSSW1-RW
TP7329-EP001	Portsmouth WTP EP001-EP

Tuscarawas

IN21804-RSSW1	Twin City Water District Stillwater Creek Intake RSSW1-RW
TP8644-EP001	Twin City Water District WTP EP001-EP
TP8644-LT2001	Twin City Water District WTP LT2001-RW

SWDO

Brown

IN21598-RSSW2	Mount Orab Village Old Reservoir Intake RSSW2-RW
IN21599-RSSW1	Mount Orab Village Sterling Run Intake RSSW1-RW
TP1764-EP001	Mount Orab WTP EP001-EP
TP1764-LT2001	Mount Orab WTP LT2001-RW
IN21594-RSSW2	Waynoka Regional Sycamore Run Reservoir RSSW2-RW
IN21595-RSSW1	Waynoka Regional Upground Reservoir Intake RSSW1-RW
TP1762-EP001	Waynoka Regional Water & Sewage WTP EP001-EP

Clermont

IN21808-RSSW1	Clermont Co Bmwt East Fork Lake Intake RSSW1-RW
TP2182-EP003	Clermont Co Bmwt Plant EP003-EP
TP2183-EP002	Clermont Co Mgs Plant EP002-EP
TP2184-EP001	Clermont Co Pub Plant EP001-EP

Clinton

RS33761	Blanchester Reservoir 1
RS33676	Blanchester Reservoir 2
IN21670-RSSW2	Blanchester Stonelick Creek Intake RSSW2-RW
IN21668-RSSW4	Blanchester Village Reservoir 5 Intake RSSW4-RW
IN21669-RSSW3	Blanchester Village Westboro Reservoir Intake RSSW3-RW
IN21671-RSSW1	Blanchester Village Whitacre Run Reservoir 3 Intake RSSW1-RW
TP2186-EP001	Blanchester Village WTP EP001-EP
TP2186-LT2001	Blanchester Village WTP LT2001-RW
IN35413	Blanchester West Fork East Fork Little Miami River Intake
IN21672-RS001	Wilmington Caesar Lake Intake RS001-RW
IN21674-RS003	Wilmington Cowan Creek Intake RS003-RW
IN21673-RS002	Wilmington Reservoir Intake RS002-RW
TP2191-EP001	Wilmington WTP EP001-EP

Darke

IN21590-RSSW1	Greenville Greenville Creek Intake RSSW1-RW
IN21589-RSSW2	Greenville Mud Creek Intake RSSW2-RW
TP2575-EP001	Greenville WTP EP001-EP

Hamilton

IN21626-RSSW1	Cincinnati Miller Plant Ohio River Intake RSSW1-RW
IN35415	Cincinnati Miller Plant Ohio River South Intake
TP3738-EP002	Cincinnati PWS Bolton Plant EP002-EP
TP3739-EP001	Cincinnati PWS Miller Plant EP001-EP
RS37171	Cincinnati Reservoir 1
RS37172	Cincinnati Reservoir 2

Highland

IN21640-RS001	Hillsboro Clear Creek Intake RS001-RW
IN21638-RS003	Hillsboro Quarry Intake RS003-RW
IN21639-RS002	Hillsboro Reservoir Intake RS002-RW
TP4012-EP001	Hillsboro WTP EP001-EP

Miami

TP5673-EP001	Piqua EP001-EP
IN21723-RSSW3	Piqua Ernst Gravelpit Reservoir Intake RSSW3-RW
IN21724-RSSW2	Piqua Miami River Intake RSSW2-RW
IN21725-RSSW1	Piqua Swift Run Lake Intake RSSW1-RW

Montgomery

IN35433	Dayton Great Miami River Intake
IN35434	Dayton Mad River Intake 1
IN35435	Dayton Mad River Intake 2
TP5839-EP001	Dayton Miami Plant EP001-EP
TP5840-EP002	Dayton Ottawa Plant EP002-EP
IN35429	Dayton Rip Rap Rd Intake

Shelby

IN21735-RSSW1	Sidney Miami River Intake RSSW1-RW
IN35447	Sidney Miami River West Intake
IN21734-RSSW2	Sidney Tawawa Creek Intake RSSW2-RW
TP7475-EP001	Sidney WTP EP001-EP

5/3/2011

OHIO PUBLIC WATER SUPPLY LAKES				
County	**PWSID**	**Public Water System Name**	**Reservoir Or Water Source Name***	**System Type**
Allen	OH0200811	Lima City Water	Ferguson Lake Reservoir	Community
Allen	OH0200811	Lima City Water	Bresler Reservoir	Community
Allen	OH0200811	Lima City Water	Lost Creek Reservoir	Community
Allen	OH0200811	Lima City Water	Twin Lakes Reservoir I	Community
Allen	OH0200811	Lima City Water	Metzger Reservoir	Community
Allen	OH0200412	Delphos Water Treatment Plant	Surface Water Intake	Community
Ashland	OH0300411	Cinnamon Lake Utilities Assoc Inc	Cinnamon Lake Utility Co Reservoir	Community
Ashtabula	OH0400411	Conneaut City PWS	Conneaut City Lake Erie	Community
Ashtabula	OH0400711	Ohio American Water Co - Ashtabula	Ohio-American/Ashtabula Lake Erie	Community
Athens	OH0501311	Burr Oak Regional Water District	Burr Oak Lake	Community
Belmont	OH0700011	Barnesville	Barnesville Reservoir#1	Community
Belmont	OH0700011	Barnesville	Barnesville Reservoir#2	Community
Belmont	OH0700114	Bellaire Public Water System	Bellaire Infiltration	Community
Belmont	OH0701516	St. Clairsville City PWS	St. Clairsville Provident Reservoir	Community
Belmont	OH0701516	St. Clairsville City PWS	St. Clairsville Municipal Reservoir	Community
Brown	OH0800811	Waynoka Regional Water And Sewer Dist	Waynoka Regional Water & Sewage	Community
Brown	OH0800811	Waynoka Regional Water And Sewer Dist	Waynoka Regional Water & Sewage	Community
Brown	OH0801011	Mount Orab Village PWS	Mount Orab Village Old Reservoir	Community
Brown	OH0801011	Mount Orab Village PWS	Mount Orab Village Sterling Run	Community
Carroll	OH1038311	MWCD-Atwood Resort	Atwood Lake	Non-Transient Non-Community
Carroll	OH1038411	MWCD-Atwood Park	Atwood Lake	Transient Non-Community
Clermont	OH1302212	Clermont Public Water System	Clermont Co Bmwt East Fork	Community
Clinton	OH1400111	Blanchester Village PWS	Blanchester Village Reservoir 5	Community

OHIO PUBLIC WATER SUPPLY LAKES				
County	**PWSID**	**Public Water System Name**	**Reservoir Or Water Source Name***	**System Type**
Clinton	OH1400111	Blanchester Village PWS	Blanchester Village Westboro Reservoir	Community
Clinton	OH1400111	Blanchester Village PWS	Blanchester Whitacre Run Reservoir #3	Community
Clinton	OH1401211	Wilmington City PWS	Caesar Creek Lake	Community
Clinton	OH1401211	Wilmington City PWS	Wilmington City Reservoirs	Community
Columbiana	OH1500811	East Liverpool City	East Liverpool City Ohio River I	Community
Columbiana	OH1502011	Salem City	Salem City Sandy Beaver Reservoir	Community
Columbiana	OH1502011	Salem City	Salem City Salem Reservoir	Community
Columbiana	OH1502911	Buckeye Water District	Buckeye Water District Wellsville- Ohio River	Community
Coshocton	OH1600811	Echoing Hills Village	Echoing Hills Village I Lower	Community
Coshocton	OH1600811	Echoing Hills Village	Echoing Hills Village I Upper	Community
Coshocton	OH1600811	Echoing Hills Village	Shalimar Lake	Community
Crawford	OH1700011	OH1700011 (Bucyrus)	Neff Reservoir	Community
Crawford	OH1700011	OH 1700011 (Bucyrus)	Pines Reservoir	Community
Crawford	OH1700011	OH 1700011 (Bucyrus)	Outhwaite Reservoir	Community
Crawford	OH1700011	OH 1700011 (Bucyrus)	Riley Reservoir	Community
Crawford	OH1700211	Galion City	Amicks Reservoir	Community
Crawford	OH1700211	Galion City	Amman Reservoir	Community
Crawford	OH1700211	Galion City	Powers Reservoir	Community
Cuyahoga	OH1800111	Berea City PWS	Berea City East Branch Of Rocky	Community
Cuyahoga	OH1801212	Cleveland Public Water System	Baldwin	Community
Cuyahoga	OH1801212	Cleveland Public Water System	Crown	Community
Cuyahoga	OH1801212	Cleveland Public Water System	Morgan	Community
Cuyahoga	OH1801212	Cleveland Public Water System	Nottingham	Community
Fulton	OH2600111	Wauseon City Water	Napoleon / Wauseon Maumee River	Community
Fulton	OH2600111	Wauseon City Water	Maumee River	Community
Fulton	OH2600111	Wauseon City Water	Wauseon City 50 Mg Reservoir Int	Community
Fulton	OH2600111	Wauseon City Water	Wauseon City Stucky Ditch Reservoir	Community

OHIO PUBLIC WATER SUPPLY LAKES				
County	**PWSID**	**Public Water System Name**	**Reservoir Or Water Source Name***	**System Type**
Fulton	OH2600111	Wauseon City Water	Wauseon City 300 Mg Reservoir	Community
Fulton	OH2600311	Delta Village	Delta Village 108 Mg Reservoir	Community
Fulton	OH2600311	Delta Village	Delta Village 400 Mg Reservoir	Community
Fulton	OH2601011	Swanton Village	Swanton Village Reservoir	Community
Guernsey	OH3000111	Cambridge, City Of	Wills Creek	Community
Hamilton	OH3102612	Cincinnati Public Water System	Cincinnati Miller Plant Ohio River	Community
Hamilton	OH3102612	Cincinnati Public Water System	Cincinnati Miller Plt Ohio River S	Community
Hancock	OH3200111	Findlay Water Treatment Plant	Findlay City Reservoirs No 4	Community
Hancock	OH3200111	Findlay Water Treatment Plant	Findlay 1.3 Billion Gallon Reservoir	Community
Hancock	OH3200411	Mccomb Water Treatment Plant	Mccomb Village Reservoirs	Community
Harrison	OH3400214	Cadiz Village PWS	Cadiz Tappan Lake	Community
Harrison	OH3400214	Cadiz Village PWS	Cadiz Sparrow Reservoir	Community
Henry	OH3500711	HCRW/Sd-Mcclure System	Mcclure Maumee River Int	Community
Henry	OH3500811	Napoleon City	Wauseon 50 Mg Reservoir	Community
Henry	OH3500811	Napoleon City	Wauseon 300 Mg Reservoir	Community
Henry	OH3500811	Napoleon City	Napoleon City Maumee River	Community
Henry	OH3531411	Campbell Soup Supply Co	Campbell Soup Supply Co Maumee River	Non-Transient Non-Community
Henry	OH3531411	Campbell Soup Supply Co	Campbell Soup Co Maumee River 2	Non-Transient Non-Community
Highland	OH3600614	Hillsboro City	Hillsboro City Quarry	Community
Highland	OH3600614	Hillsboro City	Hillsboro City Reservoir	Community
Hocking	OH3736411	ODNR-Hocking Hills State Park	Rose Lake	Transient Non-Community
Huron	OH3900011	Bellevue City	Bellevue City 5-Upground Reservoir	Community
Huron	OH3900011	Bellevue City	Frink Run Reservoir	Community
Huron	OH3900811	Monroeville Village	Monroeville Reservoir	Community
Huron	OH3900911	New London Village-Plant 1	New London Plant 1 Upground Reservoir	Community
Huron	OH3901111	Norwalk City PWS	Norwalk Reservoir	Community
Huron	OH3901111	Norwalk City PWS	Norwalk Lower Reservoir	Community

OHIO PUBLIC WATER SUPPLY LAKES				
County	**PWSID**	**Public Water System Name**	**Reservoir Or Water Source Name***	**System Type**
Huron	OH3901511	Willard City	Willard City Upground Reservoir	Community
Huron	OH3902611	New London Village - Plant 2	New London Plant 2 Upground Reservoir	Community
Jackson	OH4000111	Jackson, City Of	Jisco Lake	Community
Jackson	OH4000111	Jackson, City Of	Hammertown Lake	Community
Jackson	OH4001912	Wellston Public Water System	Lake Rupert	Community
Jackson	OH4001912	Wellston Public Water System	Lake Alma	Community
Jackson	OH4001912	Wellston Public Water System	City Impoundment	Community
Jefferson	OH4102411	Steubenville, City Of	Steubenville City Ohio River	Community
Darke	OH1900714	Greenville City PWS	Greenville City Mud Creek	Community
Darke	OH1900714	Greenville City PWS	Greenville City Greenville Creek	Community
Defiance	OH2000111	Defiance City	Defiance Maumee River Intake	Community
Defiance	OH2000111	Defiance City	Maumee River	Community
Delaware	OH2100311	Delaware City PWS	Olentangy North Intake	Community
Delaware	OH2100311	Delaware City PWS	Olentangy South Intake	Community
Delaware	OH2101412	Del-Co Water Company, Inc.	Del-Co Olentangy Reservoir	Community
Delaware	OH2101412	Del-Co Water Company, Inc.	Del-Co Mcnamara Reservoir 1	Community
Delaware	OH2101412	Del-Co Water Company, Inc.	Del-Co Alum Creek Reservoir	Community
Erie	OH2201011	Huron Water Treatment Plant	Huron City Lake Erie	Community
Erie	OH2201111	Kelleys Island PWS	Kelleys Island Village Lake Erie	Community
Erie	OH2201411	Sandusky Water Treatment Plant	Sandusky City Sandusky Bay Reservoir	Community
Erie	OH2201411	Sandusky Water Treatment Plant	Sandusky City Lake Erie	Community
Erie	OH2201511	Vermilion PWS	Vermilion City Vermilion River I	Community
Erie	OH2201511	Vermilion PWS	Vermilion City Lake Erie	Community
Erie	OH2230411	Camp Patmos	Camp Patmos Lake Erie	Transient Non-Community
Fayette	OH2400714	Washington Court House PWS	Washington Court House Reservoir	Community
Franklin	OH2503411	Westerville City PWS	Westerville City Alum Creek	Community

OHIO PUBLIC WATER SUPPLY LAKES				
County	**PWSID**	**Public Water System Name**	**Reservoir Or Water Source Name***	**System Type**
Franklin	OH2504412	Columbus Public Water System	Columbus Dublin Road Scioto River	Community
Franklin	OH2504412	Columbus Public Water System	Columbus Hap Cremean Big Walnut	Community
Franklin	OH2504412	Columbus Public Water System	Columbus Hap Cremean Alum Creek	Community
Franklin	OH2504412	Columbus Public Water System	Columbus Hap Cremean Hoover Reservoir	Community
Fulton	OH2600011	Archbold Village	Archbold Village North Reservoir	Community
Jefferson	OH4102811	Toronto PWS	Ohio River	Community
Lake	OH4300411	Fairport Harbor Village PWS	Fairport Harbor Village Lake Erie	Community
Lake	OH4301511	Aqua Ohio Inc - Mentor	Ohio Water Service Mentor Lake Erie	Community
Lake	OH4301611	Painesville City PWS	Painesville City Lake Erie	Community
Lake	OH4301611	Painesville City PWS	Painesville City Lake Erie Int 2	Community
Lake	OH4302411	Lake County West Water Subdistrict	Lake Co West Lake Erie	Community
Lake	OH4302911	Lake County East Water Subdistrict	Lake Co East Water Lake Erie	Community
Lawrence	OH4400711	Ironton PWS	Ironton City Ohio River	Community
Licking	OH4502314	Newark City PWS	North Fork Licking Reservoir	Community
Lorain	OH4700311	Avon Lake City PWS	Avon Lake Lake Erie	Community
Lorain	OH4700411	Elyria Water Department	Elyria Water Department Lake Erie	Community
Lorain	OH4700711	Lorain City PWS	Lorain Lake Erie	Community
Lorain	OH4700911	Oberlin Water Department	Oberlin W Br Black River Reservoir	Community
Lorain	OH4701511	Wellington Village PWS	Wellington Village Upground Reservoir	Community
Lorain	OH4701511	Wellington Village PWS	Wellington Charlemont Creek Reservoir	Community
Lucas	OH4800911	Oregon City PWS	Oregon City Lake Erie	Community
Lucas	OH4801411	Toledo PWS	Toledo City Lake Erie	Community
Mahoning	OH5000411	Campbell City PWS	Campbell City Lake Mckelvey	Community
Mahoning	OH5000411	Campbell City PWS	Campbell City Lake Hamilton	Community
Mahoning	OH5001611	Aqua Ohio - Struthers	Aqua Ohio-Poland Evans Lake	Community

OHIO PUBLIC WATER SUPPLY LAKES				
County	**PWSID**	**Public Water System Name**	**Reservoir Or Water Source Name***	**System Type**
Mahoning	OH5001911	Sebring Village PWS	Sebring Village Mahoning River	Community
Marion	OH5100414	Ohio American Water Company-Marion	OH Am Water Co-Marion Little Scioto	Community
Marion	OH5100414	Ohio American Water Company-Marion	OH Am Water Co-Marion Big Scioto	Community
Mercer	OH5400011	Celina City	Celina City Grand Lake	Community
Miami	OH5501211	Piqua City PWS	Piqua City Ernst Gravelpit Reservoir	Community
Miami	OH5501211	Piqua City PWS	Piqua City Swift Run Lake	Community
Monroe	OH5600711	Woodsfield Village PWS	Woodsfield Village Reservoir 2	Community
Monroe	OH5600711	Woodsfield Village PWS	Woodsfield Village Reservoir 1	Community
Montgomery	OH5703512	Dayton Public Water System	Dayton City Miami River	Community
Montgomery	OH5703512	Dayton Public Water System	Dayton City Mad River	Community
Muskingum	OH6001411	Maysville Regional Water	Maysville Frazers Quarry	Community
Muskingum	OH6001711	New Concord PWS	New Concord Upper Reservoir	Community
Muskingum	OH6001711	New Concord PWS	New Concord Reservoir	Community
Muskingum	OH6041511	ODNR-Blue Rock State Park	Cutler Lake	Transient Non-Community
Noble	OH6100011	Caldwell Village PWS	Caldwell Village Wolf Run Lake	Community
Noble	OH6100011	Caldwell Village PWS	Caldwell Village Caldwell Lake	Community
Ottawa	OH6201911	Lake Erie Utilities Comp	Lake Erie Utilities Comp Lake Erie	Transient Non-Community
Ottawa	OH6202411	Marblehead Village PWS	Marblehead Vlg Lake Erie	Community
Ottawa	OH6203311	Put-In-Bay Village PWS	Put-In-Bay Village Lake Erie	Community
Ottawa	OH6205011	Ottawa County Regional	Ottawa County Regional Lake Erie	Community
Ottawa	OH6205011	Ottawa County Regional	Emergency Intake (Portage River)	Community
Ottawa	OH6205111	Carroll Water And Sewer	Carroll Water And Sewer Lake Erie	Community
Paulding	OH6300411	Paulding Village	Paulding Reservoir	Community
Perry	OH6400111	Crooksville	Allen Reservoir	Community
Perry	OH6400111	Crooksville	North Dry Run Reservoir	Community
Perry	OH6400111	Crooksville	South Dry Run Reservoir	Community

OHIO PUBLIC WATER SUPPLY LAKES				
County	**PWSID**	**Public Water System Name**	**Reservoir Or Water Source Name***	**System Type**
Perry	OH6400111	Crooksville	Sayre Reservoir	Community
Perry	OH6400411	New Lexington	New Reservoir	Community
Perry	OH6400411	New Lexington	Old Reservoir	Community
Perry	OH6401111	Somerset	Lake St Joseph	Community
Perry	OH6401111	Somerset	Somerset Lake	Community
Pike	OH6632414	United States Enrichment	United States Enrichment X-611-B	Non-Transient Non-Community
Portage	OH6703211	Ravenna City PWS	Ravenna City	Community
Portage	OH6766711	ODNR-West Branch-Tower	West Branch Tower Reservoir	Transient Non-Community
Putnam	OH6900711	Ottawa Village Water	Ottawa Village Reservoir	Community
Richland	OH7002914	Mansfield City PWS	Mansfield City Clear Fork River	Community
Richland	OH7004511	Shelby Water Treatment Plant	Shelby City Reservoirs No 3	Community
Sandusky	OH7200211	Clyde Water Treatment Plant	Clyde City Beaver Creek Reservoir	Community
Sandusky	OH7200311	Fremont City PWS	Fremont City Sandusky River	Community
Scioto	OH7300111	Portsmouth Public Water System	Ohio River	Community
Seneca	OH7400011	Attica Village	Honey Creek	Community
Seneca	OH7400411	Fostoria City	E Br Portage River Reservoir 1	Community
Seneca	OH7400614	Ohio American Water Co-Tiffin District	Sandusky River	Community
Shelby	OH7501214	Sidney City PWS	Sidney City Tawawa Creek	Community
Shelby	OH7501214	Sidney City PWS	Sidney City Miami River	Community
Shelby	OH7501214	Sidney City PWS	Sidney City Miami River West	Community
Stark	OH7600011	Alliance City PWS	Alliance City Walborn Reservoir	Community
Stark	OH7600011	Alliance City PWS	Alliance City Deer Creek Reservoir	Community
Summit	OH7700011	Akron City PWS	Akron City Lake Rockwell	Community
Summit	OH7700011	Akron City PWS	Akron City Ladue	Community
Summit	OH7700011	Akron City PWS	Akron City East Branch	Community
Summit	OH7700411	Barberton City	Barberton City Wolf Creek Reservoir	Community
Trumbull	OH7801811	Mahoning Valley Sanitary District	Mahoning Valley San Dist Berlin	Non-Transient Non-Community

OHIO PUBLIC WATER SUPPLY LAKES				
County	**PWSID**	**Public Water System Name**	**Reservoir Or Water Source Name***	**System Type**
Trumbull	OH7801811	Mahoning Valley Sanitary District	Mahoning Valley San Dist Meander	Non-Transient Non-Community
Trumbull	OH7802311	Newton Falls City	Newton Falls East Branch Mahoning	Community
Trumbull	OH7803811	Warren City PWS	Warren City Mosquito Reservoir	Community
Trumbull	OH7803911	West Farmington Village PWS	West Farmington, Village Grand R	Community
Tuscarawas	OH7901711	Twin City Water And Sewer District PWS	Twin City Water District Stillwater	Community
Union	OH8000314	Marysville City PWS	Mill Creek	Community
Van Wert	OH8100611	Van Wert City	Town Creek	Community
Wood	OH8700311	Bowling Green City Water	Bowling Green Reservoir	Community
Wood	OH8701611	North Baltimore WTP	North Baltimore Village 258 Mg Reservoir	Community
Wood	OH8701611	North Baltimore WTP	North Baltimore Village 100 Mg Reservoir	Community
Wyandot	OH8800511	Upper Sandusky City	Upper Sandusky City Reservoir	Community

*Based On The Best Information Available. This Is Not A Comprehensive List Of Every Reservoir Or Surface Water Source For Each Public Water System.

Surface Water Intakes at Ohio State Park lakes					
	Harsha Lake (West Branch SP)	Water Intake	41° 8'31.94"N	81° 5'55.53"W	
	Pymatuning Lake	Water Intake	41°33'46.68"N	80°31'41.32"W	

Appendix E -
2011 HAB Contacts

***Primary Contacts**

Report HABs - Public Water System Reservoirs and Finished Water

Heather Raymond*
PWS HAB Coordinator (Drinking Waters)
Ohio EPA - Division of Drinking and Ground Waters
50 W. Town St., Suite 700
P.O. Box 1049
Columbus, OH 43215
(614) 644-2911
heather.raymond@epa.ohio.gov
Fax (614) 644-2909
Laura Webb
Ohio EPA-Division of Drinking and Ground Waters
(Back-up HAB Coordinator)
614-728-1219
laura.webb@epa.ohio.gov

PWS HAB Webpage: *www.epa.ohio.gov/ddagw/HAB.aspx*

Other Ohio EPA Contacts

Ohio EPA DDAGW Management – Central Office
General phone number: (614) 644-2752
Mike Baker (Chief)
Mike Eggert (Assistant Chief-Ground Water)
Beth Messer – (Assistant Chief-Drinking Water)
Holly Kaloz – Manager (614) 644-2760

Ohio EPA DES
Kirk Leifheit, Chief
Kristin Sowards, DES Sample Coordinator*
8955 East Main Street
Reynoldsburg, OH 43068
(614) 644-4243

Ohio EPA DDAGW District DW Managers
CDO – Jose Quinones (614) 728-3778
NEDO – Nancy Rice (330) 963-1200
NWDO – Ellen Gerber (419) 352-8461
SWDO – Jeff Davidson (937) 285-6357
SEDO – Janet Barth (740) 385-8501

Public Interest Center (Media Calls) (614) 644-2160
Legislative Liaisons (Legislative Inquiries) (614) 644-2782

Report HABs – Ohio River

Greg Youngstrom
ORSANCO
5735 Kellogg Ave.
Cincinnati, OH 45228
(513) 231-7719
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Gregy@orsanco.org

APPENDIX F –
U.S. ARMY CORPS OF ENGINEERS
OHIO RESERVOIR HAB CONTACT INFORMATION

Louisville District

District POC:
Lisa E. Underwood
PhD/Limnologist
ED-EE Water Quality Team
Louisville District
US Army Corps of Engineers
Office Phone: (502) 315-6318
Office Fax: (502) 315-6309
600 Dr. M. L. King Jr. Place
Louisville, KY 40202
lisa.e.underwood@usace.army.mil

Miami River Area Office and
Individual Lake Project Contact Information:

Miami Area Manager:
Steve Lee
4020 N. Clarksville Road
Waynesville, OH 45068-9408
(513) 897-1050

Caesar Creek Lake
4020 N. Clarksville Road
Waynesville, OH 45068-9408
(513) 897-1050
Project Manager: Joe Bertolini

C.J. Brown Dam and Reservoir
2630 Croft Rd.
Springfield, OH 45503-2515
(937) 325-2411
Project Manager: Chris Rapenchuk

William H. Harsha Lake
2185 Slade Road
Batavia, OH 45103-9707
Telephone 513-797-6081
Project Manager: Jim O'Boyle

West Fork Lake
10558 McKelvey Road
Cincinnati, OH 45240-3930
(513) 851-0611
Project Manager: Dave Johnstone

Huntington District

District POC:
Steve Foster or Vince Marchese
EC-WM / Water Quality Team
Huntington District
US Army Corps of Engineers
Steve Office Phone: (304) 576-3300
Steve Office Fax: (304) 576-2624
steven.w.foster@usace.army.mil
Vince Office Phone: (304) 399-5605
Vince Office Fax: (304) 399-5960
Vincent.J.Marchese@usace.army.mil
502 8th Street
Huntington, WV 25701

Muskingum Basin

Upper Tuscarawas
Projects Office (located at Atwood Lake):
Michael Woeste
Facility Manager for all Upper Tuscarawas
(330)343-5611

Atwood Lake
3434 State Route 212 NE
Mineral City, OH 44656-9645
(330) 343-5611

Beech City Lake
Beach City Dam 5449 St Rt 250 NE
Beach City, OH 44608-9801
(330) 878-7391

Bolivar Dam Lake
11614 Glenpark Road NE
Bolivar, OH 44612-9521
(330) 874-2121

Dover Lake
5153 State Route 800, NE
Dover, OH 44612-6910
(330) 343-5725

Leesville Lake
5037 Deer Road Sw
Bowerston, OH 44695-9621
(740) 269-2131

Lower Tuscarawas Projects Office (located at Piedmont Lake):

Carmen Pennington
Facility Manager for all Lower Tuscarawas
Phone: (740) 439-4824

Piedmont Lake
32665 Belmont Ridge Road
Piedmont, OH 43983-9721
(740) 968-4440

Clendening Lake
P.O. Box 116
Tippecanoe, OH 44699-0116
(740) 658-3743

Senecaville Lake
Rfd #1
Senecaville, OH 43780-9801
(740) 685-5585

Tappan Lake
86801 Eslick Road
Urichsville, OH 44683-9802
(740) 269-2681

Walhonding
Projects Office (located at Mohawk Dam):
Jerry Michael
Facility Manager for all Walhonding Projects
(740) 824-4343

Mohawk Dam
36007 State Route 715
Warsaw, OH 43844-9534
(740) 824-4343

Charles Mill Lake
2203 State Route 603
Lucas, OH 44843-9606
(419) 368-4334

North Branch Kokosing River Lake
36007 Sr715
Warsaw, OH 43844-9534
(740) 824-4343

Pleasant Hill Lake
1041 County Road 3006
Perrysville, OH 44864-9782
(419) 938-5785

Wills Creek Lake
49320 County Road 497
Coshocton, OH 43812-9496
(740) 829-2425

Scioto Basin - Individual Lake Project Contact Information:

Alum Creek Lake
R.J. Wattenschaidt
Park Manager
5905 Lewis Center Rd.
Lewis Center, OH 43035-9215
(740) 548-6151

Deer Creek Lake
B. Maki
Park Manager
21897 Deer Creek Road
Mt. Sterling, OH 43143-9505
(740) 869-2243

Delaware Lake
B.H. O'Dell
Park Manager
3920 US 23 North
Delaware, OH 43015-9708
(740) 363-4011

Dillon Lake
C.R. Kilpatrick
Park Manager
4969 Dillon Dam Rd
Zanesville, OH 43701-9652
(740) 454-2225

Paint Creek Lake
T.J. Milnes
Park Manager
504 Reservoir Road
Bainbridge, OH 45612-9450
(937) 365-1470

Hocking Basin - Individual Lake Project Contact Information:

Tom Jenkins Dam (Burr Oak Lake)
C.R. Kilpatrick
Park Manager
23560 Jenkins Dam Road
Glouster, OH 45732-9727
(740) 767-3527

Pittsburgh District

District POC: Rose Reilly
Rose Reilly
Biologist, Water Management
US Army Corps of Engineers, Pittsburgh District
1000 Liberty Avenue
Pittsburgh, PA 15222
rosemary.j.reilly@usace.army.mil
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Berlin Reservoir
Rene' Berberich
Resource Manager
Berlin Lake
7400 Bidell Rd.
Berlin Center, OH 44401-9714
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rene.k.berberich@usace.army.mil

Mosquito Creek Lake
Diane Kolodziejski
Resource Manager
Mosquito Creek Lake
2961 Warren-Meadville Rd
Cortland, OH 44410-9321
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Michael J Kirwan Lake
Doug Krider
Resource Manager
Michael J Kirwan Reservoir
8657 Kestrel Way
Wayland, OH 44285-0058
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douglas.a.krider@usace.army.mil

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Note:

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