

Surface Water Field Sampling Manual - Appendix I

Inland Lakes Sampling Procedure Manual



Kiser Lake, August 2015

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Next Revision Due: , 2020

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Revision History

This table shows changes to this document over time. The most recent version is presented in the top row of the table. Previous versions are maintained by the OEPA Division of Surface Water Inland Lakes Coordinator.

History	Effective Date
<ul style="list-style-type: none"> • Removed mentions of sampling frequency and locations for all parameters and inserted reference to Inland Lakes Statewide QAPP and/or lake-specific QAPP • Changed mentions and processes of Cyberintern to SampleMaster • Updated SampleMaster test groups, chain of custody and label attachments • Added option to record additional field parameters, if possible/probes are available, during water column profiling on Lake Profile Data Sheet, such as chlorophyll-<i>a</i> and phycocyanin. Updated Lake Profile Data Sheet (Attachment 2, Inland Lakes Monitoring Data Sheet). • Updated/added references to 2017 DES Field Sampling Handbook, Inland Lakes QAPP (draft), and 2018 Surface Water Field Sampling Manual (and appendices) • Removed organics sampling procedures and referenced Surface Water Field Sampling Manual • Updated cyanotoxin, phytoplankton, and chl-<i>a</i> sampling procedures and combined them with the updated Integrated Tube Sampler Methodology • Included change in procedure to submerge the ITS to the full 2m depth in all lakes, as opposed to using 2x the Secchi depth • Call for dispensing samples from the ITS into a churn splitter prior to filling containers • Call for chlorophyll-<i>a</i> samples to come from the ITS (rather than a direct surface grab) and to be filtered within 6-8 hours of collection • Removed use of MgCO₃ as a preservative during chlorophyll-<i>a</i> sampling • Updated cyanotoxin procedure to call for triple rinsing PETG container prior to filling • Removed the DSW HAB response sampling procedure • Removed zooplankton sampling procedure entirely • Updated Inland Lakes Coordinator to Jeff Bohne • Typed out Beta Bottle Procedure • Removed Attachment 1 (Decision Matrices Sampling Flow Charts), Attachment 2 (Lake Modeling Methodology Sampling Profile Graphic and Flow Tracker), parts of Attachment 3 (ortho P syringe, churn splitter, pump and probe procedures), Attachment 5 (Cyberintern Procedures), Attachment 6 (Protocol for Processing Cyanotoxin Sample Submissions at DES), Attachment 7 (Data Quality Objectives) and Attachment 8 (Public Water System Lakes Sampling) 	<p>March, 2019</p>
<ul style="list-style-type: none"> • Added qPCR test to bottom sample and Phytoplankton and Cyanotoxin section 	<p>April, 2016</p>
<ul style="list-style-type: none"> • Changed the phytoplankton and cyanotoxin collection procedures as well as cyanotoxin sampling containers and separate submission form • Changed holding times for cyanotoxins 	<p>April, 2015</p>

<ul style="list-style-type: none"> • Changed lake modeling procedures • Test for cylindrospermopsin, microcystin and saxitoxin • Changed manual to reflect the order of sampling • Added Atrazine to Table 1 • Added Attachment 8 for specific requirements for PWS lakes • Added a BSA Sample Submission Form in Attachment 4 • Added updated Sample Submission Forms • Added low-level phosphorus methodology • Updated Attachment 6 	
<ul style="list-style-type: none"> • General: Changed the references to the Surveillance Manual to Appendix I of the Surface Water Field Sampling Manual <i>for bacteria, chemistry and flows</i>. • Changed the number of collections of phytoplankton and zooplankton to three times each year (Collect a sample on the first and fifth sampling events each year and on the third (July) sampling event.) • Changed the Phytoplankton/Cyanotoxin Sampling Protocols Table • Page number changes 	<p>June 17, 2013</p>

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Section A - Lake Sampling Procedures

Subsection A1. Sample Timing and Location

A1.a. Sampling Frequency

Lake sampling should occur at a frequency in accordance with the Inland Lakes Statewide Quality Assurance Project Plan (QAPP) (in draft) and/or the lake-specific QAPP, if one exists.

A1.b. Sample Locations

Selection of sampling location(s) should be outlined in the Inland Lakes Statewide QAPP (in draft) and/or the lake-specific QAPP, if one exists. At each sample location, field meter readings and lake conditions are to be recorded on the Inland Lakes Monitoring Data Sheet (Attachment 2 - Forms and Labels).

Subsection A2. Sample Labeling

Instructions for creating orders, printing chain of custody sheets and container labels using Sample Master software are found in Subsection C2 and Appendix IV of Ohio EPA's Surface Water Field Sampling Manual (2018).

Subsection A3. Water Column Profiles

Field parameters are measured with multi-parameter sondes or other meters. The field meter must be calibrated in accordance with the manufacturer instructions and Section D of Ohio EPA's Surface Water Field Sampling Manual (2018).

At regular intervals defined below, record: 1) dissolved oxygen concentration (mg/l) and percent saturation; 2) pH (S.U.); 3) conductivity ($\mu\text{mhos/cm}$) (*Note: some meters may not have a conversion feature to give this reading. Conductivity should be recorded and noted whether it is a corrected or an uncorrected reading*); and 4) temperature in degrees Celsius ($^{\circ}\text{C}$). Certain meters may have additional probes and parameter capabilities, such as chlorophyll-*a* (mg/L and RFU) and phycocyanin blue-green algae (mg/L and RFU).

The first reading should be taken at a 0.5-meter (m) depth (surface reading); the second at 1.0 m; and then spaced at 1.0 m intervals in lakes with a depth greater than 7.0 m, or 0.5 m in lakes with a depth of less than 7.0 m. A final reading should be taken at approximately 0.5 m from the bottom (bottom reading).

The probe should be adequately weighted such that it falls vertically through the water column. Care should be taken to not submerge the probe into the sediment. Alternate sample collection methods may apply as is appropriate or necessary, such as use of a submersible pump. If such methods are used, they should be recorded on the Inland Lakes Monitoring Data Sheet.

Subsection A4. Sample Collection

Water samples are taken from 0.5 m below the surface and 0.5 m above the bottom and tested for parameters listed in Table 1 of this manual. This applies whether the lake is stratified or un-stratified. Samples collected for chlorophyll-*a* and herbicide analysis (applies to Public Drinking Water Supply (PDWS) lakes) are only taken from 0.5 m below the surface. *Escherichia coli* (*E. coli*) is sampled at a depth of 1 foot below the surface.

Deploy a discrete sampler (Van Dorn style) to the desired depth and collect a grab sample, following the procedure outlined in Attachment 1 - Beta Bottle Procedure. Fill associated containers if a single grab contains enough volume to do so; otherwise place multiple grabs into a churn splitting device to homogenize prior to filling containers. See Appendix II of the Surface Water Field Sampling Manual - Churn Splitter Sampling and Maintenance Procedure (2018) for use of churn splitter.

At each sampling interval, fill 3 quart-sized Cubitainers™ (low density polyethylene) with sample volume. Samples are to be preserved and cooled as appropriate per the most recent version of the Ohio EPA Division of Environmental Services Field Sampling Handbook (Ohio EPA DES, 2017). The sample submitted for orthophosphate is dispensed into a 1-quart size Cubitainer™ during the filtration process. More details about sample containers and the sampling process are contained in the sections that follow.

Use the “Inland Lakes” test group in Sample Master for submission of inorganic samples to the Division of Environmental Services. Parameters associated with the “Inland Lakes” test group are listed in Attachment 2 - Forms and Labels. Note that organics, low level phosphorus, low level orthophosphate, chlorophyll-*a* and *E. coli* are not included in this test group and will all need to be scheduled in addition on a lake by lake basis based on study objectives.

Subsection A5. Secchi Depth

A Secchi disk is a 20-cm diameter black and white disk used to measure water transparency. Secchi disk depth should be measured between the hours of 09:00 and 16:00.

The disk needs to be deployed vertically in the water column to obtain an accurate measurement. If necessary, the boat should be anchored to avoid drift. If it's not possible or practical to anchor the boat, working from the downwind side and adding weight to the disk can be helpful. When the water is choppy, average three individual readings.

To obtain a reading, remove sunglasses (if applicable). Lower the disk into water at a location outside the influence of direct sunlight, such as within the shadow of the boat. Slowly lower the disk until it disappears completely and, at that point, attach an alligator clip or similar marking device to the line at the water's surface. While looking away, lower the line about an additional foot and then slowly raise the disk until it reappears. Attach a second marker to the line at the water's surface. The actual Secchi depth is located at the midpoint between the point of disappearance and the point of reappearance. To find this point, grasp both markers in one hand and find the center

of the loop of rope. Move one marker to that point and remove the other marker. Use an etched meter stick or metal tape measure to record the distance from the disk to this point. This will ensure consistency in the measuring methodology. Report the value to the nearest 0.1 centimeter on the Inland Lakes Monitoring Data Sheet.

Subsection A6. Total Phosphorus and Orthophosphate – Regular and Low Level

A6.a. Non-Low Level Total Phosphorus and Orthophosphate

Regular (non-low level) total phosphorus is an unfiltered parameter that is preserved with 2mL sulfuric acid. This parameter is analyzed from the quart-sized Cubitainer, which is also analyzed for other nutrient parameters including TOC, nitrate, ammonia, and TKN.

Regular (non-low level) orthophosphate and dissolved phosphorus are collected in separate quart-sized Cubitainers, after filtration. Use a 60 ml polypropylene syringe with Luer-Lock™ tip and Whatman™ 0.45μ GM/F to filter the dissolved phosphorus or orthophosphate sample. At least 50 ml of sample volume is required. Orthophosphate has 2-day holding time and is unpreserved, while dissolved phosphorus is preserved (~2 drops (0.2 mL) H₂SO₄ per 50 mL) and has a 28-day holding time. Both must be kept on ice or chilled to 6 degrees Celsius.

In samples that are sediment- or algae-laden, it is possible that the filter will clog prior to collecting 50 ml. In that case, twist off and discard clogged filter, and replace with new one. The syringe will become difficult to push when the filter is clogged. Once you encounter moderate resistance, DO NOT push harder or you may burst the filter, and you'll have to start over.

A6.b. Low Level Total Phosphorus and Orthophosphate Sampling Requirements

Generally, low level methods can be restricted to surface samples. Best professional judgement and lake specific data objectives should be used to determine if low level methods are needed for bottom samples.

Low-level samples are submitted in a 125 ml glass jar with a Teflon™ lined polypropylene cap. The jars need to be pre-rinsed 3 times with Nanopure™. This can be done in the office or field.

A6.c. Low Level Total Phosphorus

The low-level total phosphorus sample is non-filtered and preserved with 0.5 ml H₂SO₄ per 125 ml of sample. The preservative needs to be added within 15 minutes of collecting the sample. The jar can be pre-dosed with preservative after it has been rinsed.

A6.d. Low Level Orthophosphate

The low-level orthophosphate sample is filtered and non-preserved. Use a 60 ml polypropylene syringe with Luer-Lock™ tip and Whatman™ 0.45μ GM/F to filter the low-level orthophosphate sample. The syringe and filter tip need to be pre-rinsed with Nanopure™.

- i. Draw 60 ml of Nanopure™ into the syringe and discard the rinsate a total of two times.
- ii. On the third rinse, attach the filter to the tip first and then discard the rinsate.
- iii. Remove the filter, draw 60 ml of sample into the syringe and re-attach the filter. Discard the first few milliliters of sample before dispensing into the sample container.

Subsection A7. Organics

A7.a. Atrazine Sampling

Atrazine should be collected in accordance with the Inland Lakes Statewide Quality Assurance Project Plan (QAPP) (in draft) and/or the lake-specific QAPP, if one exists. This sample is collected 0.5 meters below the surface (sampling at other depths may be determined on a case by case basis) during each sampling run, unless a change is identified in the lake-specific QAPP. Non-preserved samples are stored in a 40 ml vial on ice immediately after collection and analyzed using the ELISA method.

The ELISA method is ideal for the rapid screening of large numbers of samples. If results exceed 1.5 ug/l, confirmation samples using the more precise USEPA 525.5 method should be collected in accordance with the Inland Lakes Statewide Quality Assurance Project Plan (QAPP) (in draft) and/or the lake-specific QAPP, if one exists. The 525.2 method requires a total of two 1-liter amber jars, both of which are preserved with sodium sulfite (Na_2SO_3) and 6N HCl. Sodium sulfite should be added to the jar first, then add sample and mix, then add 6N HCl. Request these specific preservatives from the Ohio EPA laboratory.

A7.b. Other Organics

Other water column organics (semi volatiles, PCBs, etc.) not part of the baseline lakes sampling should only be collected if determined to be necessary to address data quality objectives beyond routine assessment. For example, collection of samples for analysis of priority pollutant organic compounds may be necessary in lakes where source water data from a public water supply indicates the potential for a problem, where there are known impairments for fish tissue consumption, or where contaminated sediments exist. In these cases, the lake-specific QAPP should address reasoning for collection of the samples, the parameters for analysis, the depth(s) of sample collection, the number of samples necessary to meet the data quality objectives, and quality assurance/quality control practices for sample collection.

When sampling for semi-volatile organics and pesticides, samples should be collected at 0.5 meters below the surface during the spring and fall runs only, unless otherwise called for in the lake-specific sampling plan. There is no laboratory test group parameter list for organics. Subsection E, Part C of Ohio EPA's Surface Water Field Sampling Manual (2018) details the methods for collection of organic parameters. For glyphosate analysis, add 4 mg of $\text{Na}_2\text{S}_2\text{O}_3$ to two 40-ml vials and fill with sample. Shake vigorously to mix preservative.

Note: Be aware of possible contamination of organic samples from the boat motor if using a gas-powered engine.

See Table 1 for information on container type and size, analysis methodology, preservatives and holding times.

Subsection A8. Integrated Tube Sampler Methodology for Cyanotoxin, Phytoplankton and Chlorophyll-a Sampling

A8.a. Integrated Tube Sampler Description

Water samples for phytoplankton enumeration and analysis of chlorophyll-*a* and cyanotoxin concentrations will be collected using an integrated tube sampler (ITS). The ITS is a 2-m long section of 1.25-inch (ID) PVC pipe capable of holding approximately 2 L of water. The bottom is fitted with a ball valve and the top is fitted with an end cap and rubber stopper. The device is deployed vertically in the water column to collect a whole water sample from the surface to a depth of 2 m. Contents from the ITS are either placed directly into a churn splitter to process the samples on board or into a 2 L brown HDPE bottle to process on shore or in a lab.

A9.b. Cyanotoxin, Phytoplankton and Chlorophyll-*a* Sampling Frequencies

Samples for analysis of chlorophyll-*a*, phytoplankton, and cyanotoxins (microcystin, cylindrospermopsin and saxitoxin) should be collected in accordance with the Inland Lakes Statewide Quality Assurance Project Plan (QAPP) (in draft) and/or the lake-specific QAPP, if one exists.

Cyanotoxin samples should be scheduled separately with the lab and created as a separate order in Sample Master so they have a unique sample ID number. This is being done to expedite availability of the toxin results.

A9.c. Integrated Tube Sampler Procedure

- i. Open the ball valve at the bottom of the tube and remove the rubber stopper from the top. Field rinse with site water by submerging and draining the sampler three times. One side of the boat should be used for rinsing and the other for sampling. Water from the third rinse can be used to pre-rinse other equipment, such as the churn splitter or brown bottle.
- ii. After the rinses are complete, slowly lower the sampler as vertically as possible into the water column to the end cap (2 meters) and seal the top with the rubber stopper. If the depth at the site is less than 2 meters, the sampler can be deployed at a shallower depth to avoid disturbing the bottom sediment.
- iii. Slowly raise the sampler as vertically as possible until the bottom is near the surface and close the ball valve.
- iv. Lift the sampler into the boat. If the samples are going to be processed on board, place the contents of the tube into a churn splitter. For this application, an 8 L churn splitter works best because the sample can be effectively homogenized with one grab from the tube. If the samples are going to be processed elsewhere, place the contents of the tube into a 2 L brown HDPE bottle and place in a cooler with wet ice. Minimize exposure to sunlight.

A9.d. Chlorophyll-*a* Sampling

Chlorophyll-*a* is a photosynthetic pigment present in phytoplankton that can be measured in the filterable residue obtained from a known volume of water. Filtration volume will depend on the particulate load of the water and should be great enough to generate a noticeable discoloration of the filter. About 100-200 ml of sample water is required for most lakes. The standard filter used for the inland lakes program is the 47mm diameter Whatman® GF/C (1.2 µ). There may be circumstances involving more specialized studies where the QAPP and DQOs will justify the selection of alternative filters, such as Whatman GF/FTM (0.7 µ).

Filtering should be performed in subdued light as soon as possible after sampling to avoid errors resulting from changes in the algal populations in the sample after collection. If the water sample cannot be filtered immediately, it is to be placed in an amber jar and stored on ice in darkness. Filtration is to occur within 6-8 hours of water sample collection in accordance with Section A of Appendix II of Ohio EPA's Surface Water Field Sampling Manual (2018).

- i. Whether filtration is conducted in the field or in the lab, all apparatuses should be clean and acid free. Start with a flask and filter plate and place a GF/C filter on top with a pair of tweezers. Attach the funnel and connect a vacuum source equipped with gauge and regulator.
- ii. Dispense a sub-sample from the churn splitter into a graduated cylinder so the volume can be measured. If the sample was placed into a 2 L brown HPDE bottle, thoroughly but gently agitate the container to suspend the particulates (stir or invert several times) prior to dispensing a subsample.
- iii. Pour the subsample into the funnel of the filtration apparatus. Rinse the cylinder with a small amount of DI water and add to the funnel. Apply a vacuum, **being careful not to exceed a pressure of 15 cm Hg**. Filtration time **should not exceed 10 minutes**. Higher filtration pressures and times may damage cells and result in loss of chlorophyll.
- iv. Before the funnel is dry, rinse the sides with a small amount of DI water, and as the final volume approaches the level of the filter, slowly release the vacuum.
- v. Remove the filter from the base with tweezers and fold it in half so that the phytoplankton is inside. Set the folded filter on the foil and wrap to protect the sample. Record the sample location, date, time and volume on the foil. Place the wrapped filter in a labeled plastic bag to which the sample label is affixed. Put the bag in a cooler of wet ice if in the field or in a freezer if in a lab. Samples should be delivered to the lab either the same day or via courier overnight or by the morning of the next day using the chlorophyll-*a* sample submission form in Attachment 2 - Forms and Labels. The filter may be kept on ice or sandwiched between two ice packs.
- vi. If using the same filtering apparatus for multiple sampling locations, clean the apparatus between filtering with distilled water. Submit at least one equipment blank following this protocol, collected at the end of sample filtration, to demonstrate decontamination methods are effective.

A9.e. Phytoplankton Sampling

A whole water sample for species-level phytoplankton density (cells/L) and biovolume ($\mu\text{m}^3/\text{L}$) analysis will be collected at L-1 and/or station(s) identified in the lake-specific QAPP following the ITS Methodology above.

A sub-sample from the churn splitter will be dispensed into a labeled 125-ml glass jar and preserved with approximately 30 drops of stock Lugol's solution per 100-ml sample. The final preserved sample should be the color of dark tea. If algal biomass is great, additional Lugol's may be necessary to achieve dark tea coloration (use best professional judgment). Phytoplankton labels need to be filled out by hand and indicate that Lugol's has been added.

Submit the samples directly to BSA Environmental Services, Inc. using the Chain of Custody Form in Attachment 2 - Forms and Labels. Use Ohio EPA and district name for client information. Use Ohio EPA Lazarus Government Center and Inland Lakes Program Coordinator (Jeff Bohne) for invoice information. Use Ohio EPA Inland Lakes Program for Project Name. Under special instructions, request results to be emailed to both client and invoice addresses. If the lake is a public water supply, forward a copy to the DDAGW HAB coordinator as soon as possible.

A9.f. Cyanotoxin Sampling

Whole water samples for cyanotoxin analysis will be collected using an integrated tube sampler following the ITS Methodology above, at locations and a frequency detailed in the Inland Lakes Statewide Quality Assurance Project Plan (QAPP) (in draft) and/or the lake-specific QAPP, if one exists. Dispense any needed cyanotoxin samples from the churn splitter into the appropriate containers.

Use a labeled, non-preserved 250-ml polyethylene terephthalate glycol (PETG) container that has been **triple rinsed with sample water** for the microcystins/cylindrospermopsin /qPCR sample. This sample is non-preserved.

Use a labeled 40 ml vial pre-dosed with preservative for the saxitoxin sample.

All cyanotoxin samples must be protected from sunlight and cooled on ice to 6° C immediately after collection. Submit toxin samples to DES along with all other chemistry samples.

Subsection A9. Bacteria

Bacteria (*Escherichia coli*) samples should be collected at locations and a frequency detailed in the Inland Lakes Statewide Quality Assurance Project Plan (QAPP) (in draft) and/or the lake-specific QAPP, if one exists.

The bacteria sample should be collected as follows:

- i. Remove the seal and cap of the sterile container.
- ii. Invert the bottle and submerge the container to a depth of 1 foot. Be careful not to stir up any sediment or algae in the area of the collection.
- iii. In a smooth and continuous motion, turn up the submerged container and quickly remove above the surface of the water.
- iv. Secure cap on container and place on ice immediately. Samples must be delivered to the testing lab within 6 hours of collection.

Note: If a sample is to be collected near the boat ramp, collect it approximately 50 feet from the shoreline of the dock.

Note: If Ohio DNR or other organization is collecting Level 3 data at bathing beaches, we can use that information to supplement Ohio EPA data to evaluate use attainment.

Subsection A10. Sediment

Sediment samples should be collected at locations and a frequency detailed in the Inland Lakes Statewide Quality Assurance Project Plan (QAPP) (in draft) and/or the lake-specific QAPP, if one exists. If the sediment screening turns up parameters of human health concern, then subsequent sampling of the water column should occur in accordance with the Inland Lakes Statewide QAPP (in draft) and/or the lake-specific QAPP, if one exists.

Sediment samples are to be collected only after all other measurements and sampling at a sampling station are complete.

- i. Collect sediment samples using a dredge (i.e., Ponar or Eckman) to bring bottom sediments to the surface.
- ii. Deposit sediment into a clean stainless steel bucket and remove any large woody debris, rocks and leaves. Decant any significant water if present.
- iii. Using a clean stainless-steel scoop, mix the sediment until it is homogenous and then place sediment into a 500 ml amber jar and 250 ml HDPE jar.
- iv. Carefully clean the rim of the containers prior to capping and place sediment samples in a plastic zip-lock bag.

Follow QA/QC methods in the Appendix III (Sediment Sampling) of Ohio EPA's Surface Water Field Sampling Manual (2018).

Subsection A11. Decontamination Protocol

All sampling equipment should be properly cleaned after each use and prior to the next sampling event. This includes using a brush to remove any algae and/or debris, then washing each piece of equipment with a phosphate-free detergent, followed by a tap water rinse and a distilled water rinse.

Ensure that the boat and trailer are properly decontaminated prior to launching in order to avoid transporting nuisance species from one body of water to another.

Subsection A12. Quality Assurance/Quality Control

Per section B6 of the Quality Assurance Project Plan (QAPP) for Inland Lakes Assessments - Statewide (in draft) and Appendix IV of Ohio EPA's Surface Water Field Sampling Manual (2018), duplicate samples will be collected at a minimum of five (5) percent of the total water samples. Additionally, field and equipment blanks will be collected at a minimum of 5 percent of the total water samples. Matrix spike duplicates will be collected for organic water samples at a minimum of 5 percent. Field instruments will be calibrated using manufacturer guidelines and requirements, and as outlined in the Surface Water Field Sampling Manual (2018).

Table 1. Containers/Methods for Baseline Lake Sampling					
Matrix	Container	Analytical Group(s)	Method(s)	Preservative	Holding Time
Sediment	1-500 ml Amber jar	BNA PCBs	8082, 8270	Non	14 days
Sediment	1-250 ml opaque square jar (HDPE)	Nutrients* TOC, select metals including Hg**	ICP (Zn, Cr, Cu, Pb) otherwise several methods, (see lab manual for current methods)	Non	7 days (sediment nutrients); up to 6 months for other parameters
Water	1-qt. cubitainer	Nutrients (TOC, nitrate, ammonia, TKN, Total P)	Several	H ₂ SO ₄	28 days
Water	1-qt. cubitainer	Metals (No Hg)	ICP-MS1, ICP-1	HNO ₃	6 months
Water	1-qt. cubitainer	"Demand", nitrite, sulfate	Several	Non	24 hours to 28 days
Water	1-qt cubitainer	Ortho-P	260.81	Filtered (NP)	48 hours
Water	1-125 ml glass jar	Total P	Low Level	Sulfuric Acid	28 days
Water	1-125 ml glass jar	Ortho-P	Low Level, 260.83	Filtered (NP)	48 hours
Water	2-Amber jars (only needed if triggered by a previous elevated result)	Atrazine (at PWS lakes only)	525.2	HCl/Na ₂ SO ₃	14 days
Water	1-40 ml glass vial	Atrazine (at PWS lakes only)	ELISA	None	14 days
Water	glass fiber filter	Chlorophyll- <i>a</i>	U.S.A. EPA Method 445	(freeze)	25 days
Water	1-speciman jar	<i>E. coli</i>	QTRAY	Non	6 hours
Water	1-125 ml graduated glass jar	Phytoplankton		0.7 ml (10 drops from eye dropper/100 ml sample) Lugol's within 8 hours of collection	Send all phytoplankton to BSA (Lugol's solution expires after 1 year)
Water	1-250 mL PETG container provided by DES	Microcystin/ Cylindrospermopsin/qPCR	703, 701, 705	None (freeze if can't get to DES within holding period); keep cool and in dark	5 days (can be longer if frozen)***
Water	1-40 ml glass vial with preservative	Saxitoxin	702	Preservative already included in the vial. Must stay refrigerated	6 days (can be longer if frozen)*** (Preservative in vials; expires after 1 year in the refrigerator)

*Must request prior approval on sediment nutrient submittal. Nutrients include neither TKN nor nitrate.

**Hg – request prior approval, 28-day holding time. (Prior approval is also required for chlorophyll-a, orthophosphate, E. coli, chloride, carbonate, bicarbonate)

*** When freezing, allow adequate volume for expansion and place the sample container on its side.

Attachment 1 - Beta Bottle Procedure

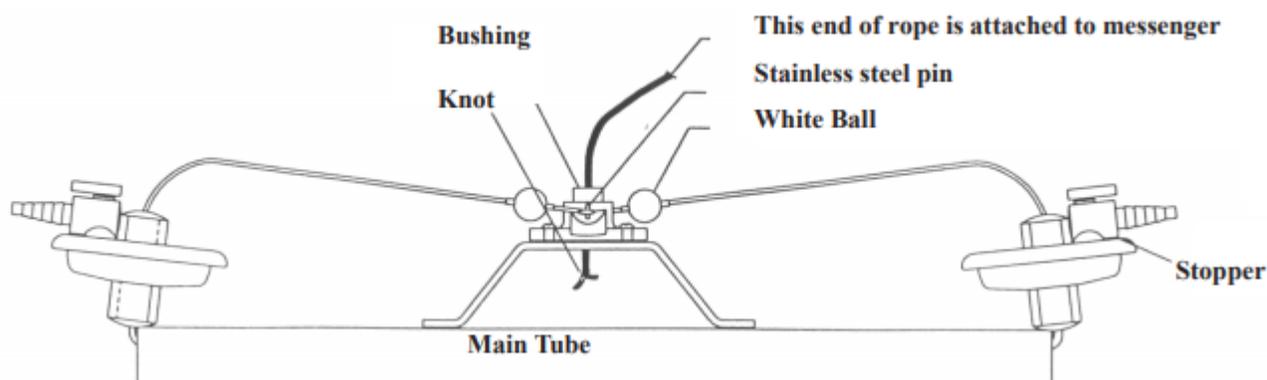
Operating Instructions for 1920-1940 Horizontal Beta™ Bottles (from Wildlife Supply Company, 2004)

Safety: To prevent personal injury, keep your hands clear of open ends of the main tube while the bottle is in the open position.

- The bottle release mechanism is designed to be used only in a non-series operation mode.
- A messenger is required to activate the tripping mechanism. Wildco® recommends an 11 oz. messenger (such as 45-B10) unless there is a very long air drop and the bottle is close to the surface of the water, in which case a lighter weight messenger may be desirable.
- The maximum height a messenger should be dropped through the air is 30 feet (10m). Distances greater than this can damage the bottle. Use a Wildco® shock absorber (45-B40) for long air drops. For air drops longer than 50 feet, please call for advice on the best method of tripping your bottle without damaging it.

Procedure:

1. Make a preliminary inspection prior to use of the bottle. Close the air vent and the drain valve.
2. Place the bottle so that the bushing on the trip mechanism is on the top of the handle.
3. Run a line or cable through the hole in the trip assembly and knot the line or secure the cable so that it cannot pull back through the hole. It must be securely fastened to hold the weight of the bottle when filled with the sample.
4. Find the two stainless steel (SS) pins in the trip assembly. Both pins are 1/16" above the plastic trip assembly.
5. Grasp the round, white balls on the cable assembly. Pull the stopper out of the end of the main tube so the loop in the cable can be placed over the closest pin of the trip assembly.
6. Repeat the above instructions with the other stopper and hook the cable loop on the pin which projects above the plastic trip assembly. The bottle is now in the "SET" position.
7. Lower the bottle to desired depth in the water, keeping the line taut. Pull bottle sideways to obtain a water sample for the desired depth. Drop messenger down the line. It will strike the tripping mechanism, causing the cables to release and the stoppers to close, trapping the sample inside the bottle.



(Ref: <https://wildco.com/wp-content/uploads/2017/05/1920-1940-Beta-Horizontal-Bottle.pdf>)

Attachment 2 - Forms and Labels

Inland Lakes Sample Master Test Group

Matrix	Test Group	Test	Method
	-TG Inland Lakes	Alkalinity	220.1 (310.1)
		Aluminum	401.1 (200.7/6010)
		Ammonia	250.4 (350.1)
		Arsenic	460.1 (200.8/6020)
		Barium	401.1 (200.7/6010)
		Cadmium	460.1 (200.8/6020)
		Calcium	401.1 (200.7/6010)
		Carb-Bicarb	220.1 (SM 2320B)
		Chloride	230.2 (325.1)
		Chromium	460.1 (200.8/6020)
		Copper	460.1 (200.8/6020)
		Hardness, Total	401.1 (200.7/6010)
		Iron	401.1 (200.7/6010)
		Lead	460.1 (200.8/6020)
		Magnesium	401.1 (200.7/6010)
		Manganese	401.1 (200.7/6010)
		Nickel	460.1 (200.8/6020)
		Nitrate	250.7 (SM4500-NO3)
		Nitrite	250.5 (353.2)
		Orthophosphate	260.81 (365.1)
		Potassium	401.1 (200.7/6010)
		Selenium	460.1 (200.8/6020)
		Sodium	401.1 (200.7/6010)
		Strontium	401.1 (200.7/6010)
		Sulfate	270.3 (375.2)
		TKN	250.6 (351.2)
		TOC	335.3 (SM 5310C)
		Total Dissolved Solids	130.2 (SM 2540C)
		Total Suspended Solids	130.3 (SM 2540D)
		TP	260.8 (365.4)
		Turbidity	141.2 (SM 2130B)
		Zinc	401.1 (200.7/6010)

Note: parameters (such as organics, *E. coli*, or sediment samples) may need to be added or removed from this list on a lake-specific basis as outlined in the lake-specific QAPP.

Lake Profile

Depth (m)	Temp (°C)	SpCond (µmhos/cm)	D.O. (% sat.)	D.O. (mg/l)	pH (S.U.)	BGA-PC (RFU)	BGA-PC (µg/L)	Chlor a (RFU)	Chlor a (µg/L)	Time
Example	XX.XX	XXX	XX.X	XX.XX	X.XX	XX.XX	XX.XX	XX.XX	XX.XX	XX:XX
0.5										
1.0										
1.5 / 2.0										
2.0 / 3.0										
2.5 / 4.0										
3.0 / 5.0										
3.5 / 6.0										
4.0 / 7.0										
4.5 / 8.0										
5.0 / 9.0										
5.5 / 10.0										
6.0 / 11.0										
6.5 / 12.0										
7.0 / 13.0										
14.0										
15.0										
16.0										
17.0										
18.0										
19.0										
20.0										
21.0										
22.0										

Modified April 2017

Phytoplankton Labels



DATE:

DISTRICT: CDO

LAKE:

Station:

SAMPLE INTERVAL(S):

PRESERVATIVE:

COLLECTION METHOD:

COLLECTOR(s):

OTHER INFO: _____



DATE:

DISTRICT: CDO

LAKE:

Station:

SAMPLE INTERVAL(S):

PRESERVATIVE:

COLLECTION METHOD:

COLLECTOR(s):

OTHER INFO: _____

Inland Lakes Program



DATE:

DISTRICT: CDO

LAKE:

Station:

SAMPLE INTERVAL(S):

PRESERVATIVE:

COLLECTION METHOD:

COLLECTOR(s):

OTHER INFO: _____

Inland Lakes Program



DATE:

DISTRICT: CDO

LAKE:

Station:

SAMPLE INTERVAL(S):

PRESERVATIVE:

COLLECTION METHOD:

COLLECTOR(s):

OTHER INFO: _____

Sample Master Sample Labels Example

17051901-01
5/23/2017 204475
AMANN RESERVOIR, L-1 Bottom
HNO3
Preservative

17051901-01
5/23/2017 204475
AMANN RESERVOIR, L-1 Bottom
NP
Preservative

17051901-01
5/23/2017 204475
AMANN RESERVOIR, L-1 Bottom
NP FILT
Preservative

17051901-01
5/23/2017 204475
AMANN RESERVOIR, L-1 Bottom
H2SO4
Preservative

17051901-02
5/23/2017 204475
AMANN RESERVOIR, L-1
Surface
H2SO4
Preservative

17051901-02
5/23/2017 204475
AMANN RESERVOIR, L-1
Surface
HNO3
Preservative

17051901-02
5/23/2017 204475
AMANN RESERVOIR, L-1
Surface
NP
Preservative

17051901-02
5/23/2017 204475
AMANN RESERVOIR, L-1
Surface
NP
Preservative

17051901-02
5/23/2017 204475
AMANN RESERVOIR, L-1
Surface
NP
Preservative

17051901-02
5/23/2017 204475
AMANN RESERVOIR, L-1
Surface
NP FILT
Preservative

17051901-03
5/23/2017 204614
AMICKS RESERVOIR, L-1
Bottom
NP
Preservative

17051901-03
5/23/2017 204614
AMICKS RESERVOIR, L-1
Bottom
HNO3
Preservative

17051901-03
5/23/2017 204614
AMICKS RESERVOIR, L-1
Bottom
NP FILT
Preservative

17051901-03
5/23/2017 204614
AMICKS RESERVOIR, L-1
Bottom
H2SO4
Preservative

17051901-04
5/23/2017 204614
AMICKS RESERVOIR, L-1
Surface
H2SO4
Preservative

Sample Master Chain of Custody Example



Chain of Custody (COC)/Sample Submission Form (SSF)

Division of Environmental Services
8955 E Main St - Bldg 22
Reynoldsburg, OH 43068

Page 1 of 1

To schedule samples call 614-644-4243

Client (Bill To):	DSW-CDO			LAB USE ONLY:			
Division/District:	DSW-CDO	Billing Code:	Project Name:	Amicks Reservoir	Date Received:	/ /	
Collector:		Phone #:	Project Contact:	Chloe Welch	Cooler Sealed?:	Y / N	
Customer ID:			Contact Phone:		Cooler Temp:	C	
Sample Number	Station ID	Station Name	Collection Date: Time	Matrix	Sample Type	Test/ Comments	Containers
17090118-01	204614	AMICKS RESERVOIR, L-1 Bottom	Date: Time:	Water Comments:	Grab	-TG Inland Lakes Bottom, Orthophos-LL	4
17090118-02	204614	AMICKS RESERVOIR, L-1 Surface	Date: Time:	Water Comments:	Grab	-TG Inland Lakes Surface, Atrazine, E.coli, TP	7
17090118-03	303620	CDO Blind Duplicate Surface	Date: Time:	Water Comments:	Grab	-TG Inland Lakes Surface, TP	5

1) Relinquished by (Signature):	Date	Time	3) Relinquished by (Signature):	Date	Time	Lab Comments:
Reviewed by (Signature):	Date	Time	Reviewed by (Signature):	Date	Time	
2) Relinquished by (Signature):	Date	Time	4) Relinquished by (Signature):	Date	Time	Field Comments:
Reviewed by (Signature):	Date	Time	Reviewed by (Signature):	Date	Time	

