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# Inland Lakes Sampling Procedure Manual

(This manual is a section of the Manual of Ohio EPA Surveillance  
Methods and Quality Assurance Practices)



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## **Lake Sampling Procedures**

### **Sample Timing and Location**

Lake sampling should (when practical) occur once each month May through September. The sampling should be equally spaced as possible.

At each sample location, the information in sections a-c should be collected (the first sampling location is generally the deepest location or may be the midpoint of the lake) and recorded on the Lake Sampling Data Sheet (Attachment 4.) Additional sampling locations ( i.e L2, L3 etc.) may be necessary.

Additional sample locations may be needed if: 1) Reservoir is greater than 20 km long 2) Interest in Trophic State Status of various locations in lake or 3) Major inflows occurs within lake at different locations, or where the lake is divided into significant sub-lake units by causeways with narrow connectors. These additional locations should be coordinated with the modeling staff as the study plans are developed to ensure adequate coverage in the event a BATHTUB model is required.

### **Sample Labeling**

**Lake Station Name, EA3 Station Number, Date, Preservatives**  
**(Specific labeling instructions for different sample types are also provided below)**

Use existing EA3 station ID if there is one, otherwise create one. If a valid EA3 station ID has not been established, one should be generated using the EA3 station creation application. Please note that historical water body ID-based stations should not be used. If collecting samples to be used in the BATHTUB model, refer to Attachment 2 for BATHTUB Methodology and the BATHTUB Template in Attachment 4 to supplement sections d and f below:

**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 properly calibrated no longer than 24 hours prior to sampling of the lake. At regular intervals record: (1) dissolved oxygen concentration (mg/l) and percent saturation, (2) pH (S.U.), (3) specific conductivity ( $\mu\text{mhos/cm}$ ) (Some meters may not have a conversion feature to give this reading. Conductivity should be recorded and that it should be listed whether it is a corrected or uncorrected reading.) and (4) temperature in degrees Celsius ( $^{\circ}\text{C}$ ). The first reading should be taken at the surface (0.5 m depth), the second at 1.0 m, and then at 1.0 m intervals (0.5 m in lakes with a depth of less than 7.0 m). Final readings should correspond with the depth of the bottom samples approximately 0.5m from the bottom. Readings can be collected using a field meter connected to an appropriate length cord. 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. A submersible pump may also be used to pump water from specific depths to collect field readings. If using this method, be sure that all probe readings are stable before the actual data is recorded and that the hose is properly weighted to insure that the end is at the appropriate depth.

**Secchi Depth.** (20 cm diameter black-white disk). To measure Secchi depth, 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. 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. Lower the line an additional foot (30 cm), and then 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. Without stretching the line, use an etched meter stick 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.

Secchi depth should be measured between 0900 hr and 1600 hr for US North American latitudes during the spring, summer and fall months. When the water is choppy, average three readings.

**Chlorophyll *a* Samples.** Water may be obtained by a pump or grab sampler (i.e., Kemmerer bottle or Van Dorn sampler.) Collect the sample water at a depth of 0.5m. Filtration volume size will depend on the particulate load of the water and should be great enough to generate a noticeable discoloration of the filter generally

100-200 ml of sample water is required. 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 stored on ice in darkness. Filtration is to occur within 24 hours of water sample collection.

Whether on board or in the lab, all apparatus should be clean and acid free. Assemble the filtration apparatus by gently resting the filter (refer to next paragraph) on the clean 47 mm filter plate. Attach the clean tower/funnel and connect the vacuum source with vacuum gauge and regulator. Vacuum filtration should not exceed a pressure of 15 cm Hg. Filtration time should not exceed 10 minutes. Higher filtration pressures and excessively long filtration times may damage cells and result in loss of chlorophyll.

The standard choice of filter used for the Inland Lakes Sampling Program is the Whatman GF/C<sup>TM</sup>. The program's Quality Assurance Project Plan (QAPP) provides an explanation under the data quality objective (DQO) section. There may be circumstances involving more specialized studies where the QAPP and DQOs will justify the selection of alternative filters such as Whatman GF/F<sup>TM</sup> (0.7  $\mu$ ).

Prior to drawing a subsample from the bulk water sample container, thoroughly but gently agitate the container to suspend the particulates (stir or invert several times). Pour the sub-sample into a clean graduated cylinder and accurately measure the volume. Sample volumes should remain consistent for a given site.

Pour the subsample into the filter tower/funnel of the filtration apparatus and apply a vacuum (remember not to 15 cm Hg). Do not draw the filter dry with the vacuum; instead slowly release the vacuum as the final volume approaches the level of the filter. Add 1 ml of MgCO<sub>3</sub> (supernatant from a supersaturated container) and gently swirl the filter apparatus to distribute the MgCO<sub>3</sub> before completely releasing the vacuum as the last bit of buffered water is pulled through the filter. Remove the filter from the base with tweezers and fold it in half once so that the particulate matter is inside. Carefully wrap the folded filter with labeled aluminum foil to protect the phytoplankton from light and store the filter frozen. The filter may be kept on ice or sandwiched between two ice packs for up to 4 hours before being frozen. Record the sub-sample volume on the chlorophyll sample submission sheet and on the foil wrapper for the filter. Freeze the sample as soon as possible and before shipping to the laboratory. Then send the filter to the laboratory between two freezer packs. If the laboratory will not process the filter immediately upon receipt, the laboratory should store the sample at -20° C.

For quality control purposes, collect at least 10% duplicates and 5% blanks. Before running the blanks, rinse the glassware with distilled water and conduct the filtration process using the exact same procedures and volumes as used for the lake sample. If using the same filtering apparatus, clean the apparatus between filterations. See the DSW Surveillance Manual for the decontamination methodology.

USEPA Method 445 is utilized to determine chlorophyll *a* in algae by fluorescence. A full Adobe Acrobat Description of this method can be found on line at: [http://www.epa.gov/nerlcwww/m445\\_0.pdf](http://www.epa.gov/nerlcwww/m445_0.pdf)

The extraction procedure, data analysis and calculations are attached (Attachment 3).

Use the Chlorophyll *a* Sample Submission Form (Attachment 4) to submit data to the lab.

*Important points:*

**Preservation** -- Sampled filters should be stored frozen at -20 degrees C or below in the dark until extraction. One (1) ml of MgCO<sub>3</sub> shall be added. Prepare MgCO<sub>3</sub> solution by adding enough MgCO<sub>3</sub> powder to supersaturate the solution (i.e. there should be some powder remaining on the bottom of the container).

**Labeling** – Place the filters from each sampling location in zip-lock bag or other container clearly labeled with 1) sampling location 2) date and 3) volume filtered. Label the foil containing each filter separately. If collecting more than one filter from any one location, label the foil containing each filter separately as “A”. “B”, and “C” and label the blank as “Blank”.

**Holding Time** -- Filters can be stored frozen at -20°C, or below, for as long as 3½ weeks without significant loss of chlorophyll *a*.

**Plankton Samples.** Plankton should be collected in spring and late summer. There should be at least 2 or 3 collections per lake per sampling season.

For Zooplankton Samples:

1. Use an 80 µ Wisconsin plankton net with 12 cm diameter opening.
2. Prior to each use, carefully clean and thoroughly rinse the interior of the plankton net and bucket with tap water.
3. Carefully inspect the net and buckets for holes or tears.

4. Attach the collection bucket to the “cod” end of the nets and secure.
5. Attach the bridled end of the plankton net to a calibrated line with markings every 0.5 m (you could use the line for the Secchi disk if necessary).
6. Carefully and slowly, lower the net in a constant upright position over the side of the boat.
7. Continue lowering the net until the mouth of the net is 0.7 m -1 m above the lake bottom. If the lake is deeper than 50 m, lower the net to a depth of 50 m and proceed.
8. Retrieve the net by pulling back to the surface at a steady constant rate without stopping (0.3 m or 1 ft per second).
9. Once at the surface, slowly dip the net up and down in the water without submersing the net mouth and help rinse contents into the collection bucket. Feel free to splash lake water through the sides of the net (not over the top into the mouth of the net) to dislodge and direct the plankton from the sides of the net and into the collection bucket.
10. Complete the rinsing of the net contents by spraying water against the outside of the net with a squirt bottle or similar tool.
11. Concentrate the contents of the collection bucket by tilting the bucket to one side and continually spraying until you have dislodged the majority of the plankton and have contained them in the bucket. The bucket should be less than  $\frac{1}{4}$  full of water. Excess lake water will filter out of the bucket from the screened sides.
12. Set the bucket in a 500-mL container filled three-fourths full with lake water to which a CO<sub>2</sub> tablet has been added (do not add Alka Seltzer to the trap). Be careful not to allow the CO<sub>2</sub> solution to spill over and into the bucket. Alternatively, Alka-Seltzer or club soda may be used. The CO<sub>2</sub> narcotizes the zooplankton to relax their external structure prior to preservation in ethanol. This facilitates taxonomic identification. Wait until zooplankton movement has stopped or until a majority stops moving. Release the clamp on the discharge hose and empty the sample into a sample jar while spraying down the inside of the bucket with distilled water. A 4 oz glass sample jar is mandatory. Replace the cap on the sample jar and set it aside. Spray the inside of the net and bucket with distilled water until it is clean, clamp the discharge hose and reassemble the bucket to the net.
13. Preserve zooplankton sample by using 95% ethanol after narcotizing and rinsing the animals into the sample jar with distilled water to provide a final solution of

70% EtOH. For a 4 oz. sample jar, 87 ml of 95% EtOH to 30 ml of sample provides the necessary 70% final EtOH solution for preservation.

14. Label the zooplankton sample with the template label provided in Appendix 5. Labels will not be put in the sample container.

For Phytoplankton Samples:

1. Use an integrated tube sampler (Whole Water Composite Sampler) to collect phytoplankton.
2. Open the valve on the bottom of the sampler and remove the rubber stopper cap on the top end of the sampler and field rinse by submerging the tube three times in the lake and draining. Do this on the opposite side of the boat from which other water samples are collected.
3. Slowly lower the sampler into the lake as vertically as possible. Stop when the upper end is just below the surface. (Note that if the Secchi disk reading is less than 1 meter, then the integrated sampler should only be lowered to twice the depth.)
4. Cap the upper end with the rubber stopper firmly and slowly raise the sampler.
5. When the bottom of the sampler is near the surface, another team member reaches underneath closes the valve on the bottom end. Note: This can be performed by one person, however, it is easier, and less prone to failure if done by a second sampler.
6. Lift the sampler in the boat, keeping it as vertical as possible.
7. The sample should be homogenized prior to putting it into the sample jar for preservation. Homogenization can be accomplished by emptying the sample into a 1-L plastic container and shaking it, or placing the collected sample in a clean churn splitter to mix the sample well. Use a 4 oz glass jar for plankton samples to take a sub-sample of the homogenized sample.
8. Preserve the phytoplankton sample using 0.7 ml (10 drops from an eye dropper) of stock Lugol's solution per 100 ml sample. The final preserved sample should be the color of weak tea.
9. Label the phytoplankton sample with the template label provided in Appendix 4. Labels shall not be put in the sample container.
10. Samples should be sent immediately to the Lakes coordinator in Central Office for evaluation and for a determination if algal toxin samples should be collected.

11. See Attachment 6 for HAB sampling and algal toxin sampling procedures.

## Water Samples

***Refer to Flow Charts in Attachment 1 to see what should be sampled.***

Generally, water samples are taken from 0.5 m from the surface and 0.5 m from the bottom for parameters listed in Table 1 of this manual.

[NOTE: If collecting samples for the BATHTUB model, refer to Attachment 2 for supplemental information]

For surface samples for parameters listed in OAC 3745-12-43 Table 43-12, collect the sample at a depth of 0.5 m below the surface. This sample depth also applies for sample collection for chlorophyll, and herbicides when appropriate. *E. coli* is sampled at 1 foot depth from the surface.

### Semi-Volatile Organics and Pesticides

When sampling for semi-volatile organics and pesticides, you should sample at 0.5 meter below the surface during the spring and fall runs only unless otherwise called for in the lake-specific sampling plan. There is no laboratory template parameter list for organics. A complete organic scan should be run on active drinking water lakes (lakes with active withdrawals). The Herbicide analysis (method 525.2) requires a total of two (2) liter amber jars, both of which are preserved with **sodium sulfite ( $\text{Na}_2\text{SO}_3$ )** and 6N HCL (add sodium sulfite first, request preservatives from Ohio EPA laboratory, HCL in vial should be clear). Carbamate analysis requires 4 mg of **sodium thio-sulfate ( $\text{Na}_2\text{S}_2\text{O}_3$ )** in two (2) 40 ml vials; Fill vials approximately  $\frac{1}{2}$  to  $\frac{3}{4}$  full, add acid buffer (pre-measured 1.2 ml monochloroacetic acid buffer [Chlor AC]), and top with sample (meniscus not necessary). Shake vial vigorously to mix preservatives. For Glyphosate analysis, place 4 mg of  $\text{Na}_2\text{S}_2\text{O}_3$  into (2) 40 ml vials, and fill vial with sample. Shake vial vigorously to mix preservative.

### 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 the Lake Habitat use. 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

study plan should address the need for the 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.

Use either a submersible pump or a discreet sampler (i.e., Van Dorn Sampler or Kemmerer sampler). At each sampling interval, fill 3 quart size Cubitainers™ (Low Density Polyethylene) with sample and add preservatives when appropriate.

Samples are to be cooled and preserved following the most recent Ohio EPA QA/QC Manual. Use the “Inland Lake Water” template for submission of inorganic samples to Ohio EPA laboratory. Parameters associated with the “Inland Lake Water” template are listed in Attachment 4. Be sure to call ahead to let the laboratory know you if you will be sampling for mercury (Hg) orthophosphates, chlorophyll *a*, chlorides, carbonate, bicarbonate, and any other parameter not on the inland lakes template.

If collected, two (2) non-preserved 1 liter amber jars should be filled with sample water for PCB/Chlordane/Toxaphene analysis and 2 non-preserved 1 liter amber jars should be filled for BNA semi-volatile analyses. Be aware of possible contamination 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.

### Bacteria

A bacteria sample to be analyzed for *E. coli* bacteria should be collected at each lake if no current level 3 credible data is being collected by any other entity. Collect a sample at the first station location if the lake is used for any open water recreational activity (e.g., waterskiing, boating). Collect additional samples from the surface as close to any beach as possible, if one exists. If no beach exists, then bacteria should be collected near the boat ramp or other places with potential for human contact with water. Specific sampling locations and sampling frequencies should be listed in the lake-specific sampling plan.

The bacteria sample should be collected as follows:

1. Remove the cap of the container.
2. 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.

3. Turn up the submerged container and quickly remove above the surface of the water.
4. 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.

#### Ortho-P, Pesticides, Semi-Volatiles, DDT etc.

Collect Ortho-P samples in both surface and bottom samples during each sampling run and for BATHTUB collections. Pesticides are collected from drinking water reservoirs only. Pesticide samples are collected at 0.5 meter below the surface (sampling at other depths may be determined on a case by case basis) during the spring and fall runs only unless a change is identified in the lake-specific sampling plan.

#### Algal Toxin Collection

The Lakes coordinator in Central Office will decide when or if algal toxin should be collected. The Lakes coordinator will direct where and samples should be shipped for analysis. See Attachment 6 for the sample collection and processing protocol.

### **Sediment Samples.**

***Refer to Flow Charts in Attachment 1 to see what should be sampled.***

Collect sediment samples using a dredge (i.e., Ponar or Eckman) to bring bottom sediments to the surface. Follow QA/QC methods in the current Ohio EPA "Sediment Sampling Guide and Methodologies" document. See Attachment 1, Decision Matrix for Inland Lakes Sediment Sampling for a complete list of parameters.

If the sediment screening turns up parameters of human health concern, then the water column should be tested for those parameters to determine if there is a water column impairment related to human health. This may include mercury and PCBs.

**QA/QC.** See DSW Surveillance Manual Sections 5 and 6.

Table 1. Containers/Methods for Baseline Lake Sampling.					
Matrix	Containers	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, Sulfate, Nitrate, Nitrite Ammonia, TKN, Phosphorus)		H <sub>2</sub> SO <sub>4</sub>	28 days
Water	1-qt. Cubitainer	Metals (No Hg)	ICP-MS1, ICP-1	HNO <sub>3</sub>	6 months
Water	1-qt. Cubitainer	"Demand"	Several	Non	24 hours to 28 days
Water	1-qt Filtered (Syringe)	Ortho-P (filtered NP)		Non	
Water	2-Amber jars	Herbicides	525.2	HCl/Na <sub>2</sub> SO <sub>3</sub>	28 days
Water	Glass Fiber Filter	Chlorophyll a	U.S.A. EPA Method 445	MgCO <sub>3</sub> (freeze)	
Water	1-Speciman jar	<i>E.coli</i>		Non	6 hours
Water	1- 4 ounce Glass Jar	Phytoplankton		0.7 ml (10 drops from eye dropper) Lugol's	Send To HAB Coordinator for Processing
Water	1- 4 ounce Glass Jar	Zooplankton		95% alcohol resulting in 70% alcohol dilution	Send To Lake Coordinator Processing

\*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)

Table 2. Containers/Methods for Non-Baseline Lake Samples based on BPJ. (Schedule with lab 3 weeks ahead of sampling except for algal toxins )					
Water	2-Amber jars	BNA Semi-volatiles	625	Non	7 days
Water	2-40 ml vials	Glyphosates (if requested by DDAGW)	547	Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub>	14 days
Water	2-40 ml vials	Carbamates	531.1	Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> , Acetic acid w/buffer	28 days
Water	2-Amber jars	PCBs	608	Non	7 days
Water	1- Quart Cubitainer (fill half – 500 ml))	Algal Toxin	ELISA –*** Schedule with Lakes /HABCoordinator	Non	24-48 hours on ice/in dark

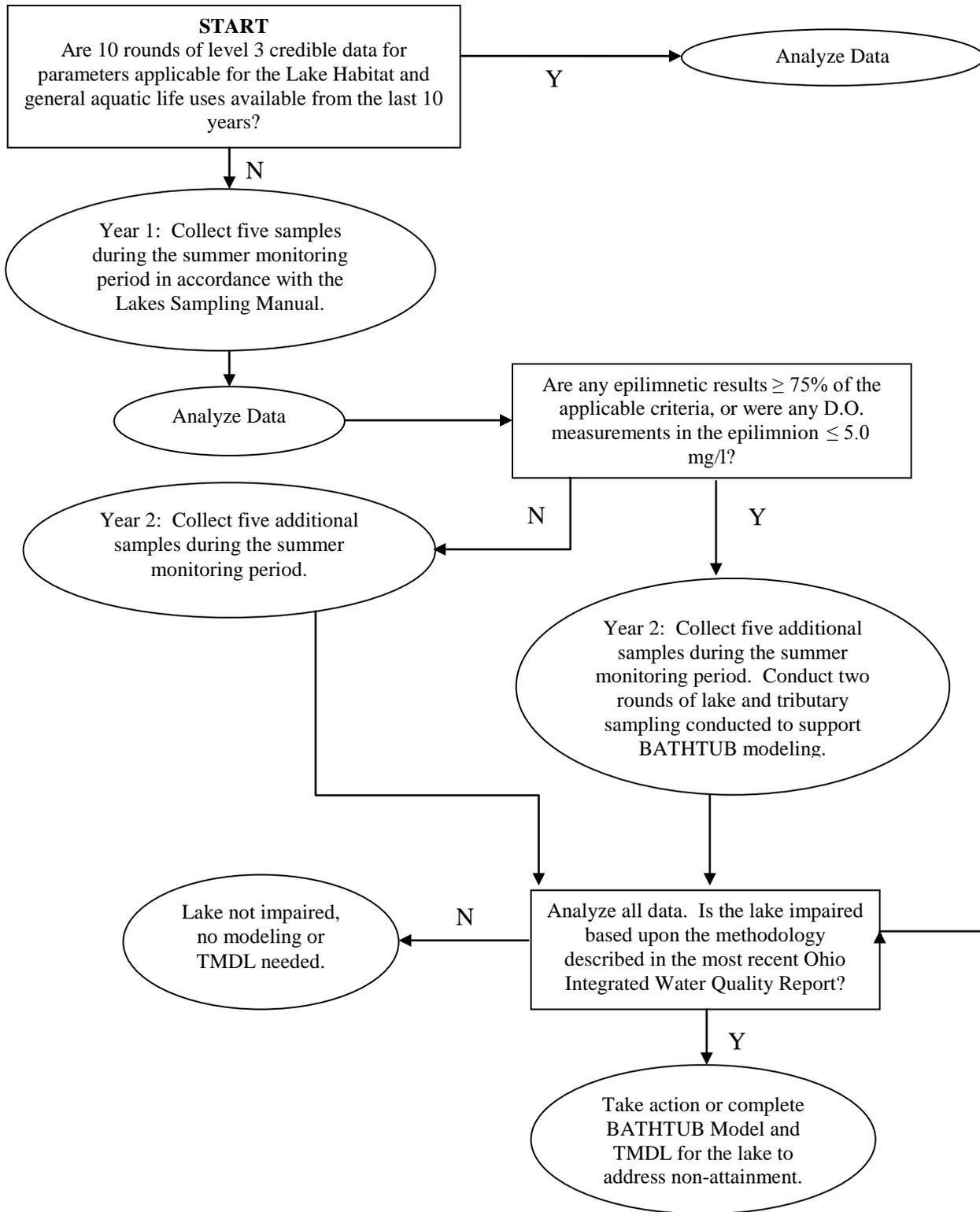
\*\*\* See Attachment 6 for Collection Procedures

All prior approval parameters need to be added to the Template when ordering.

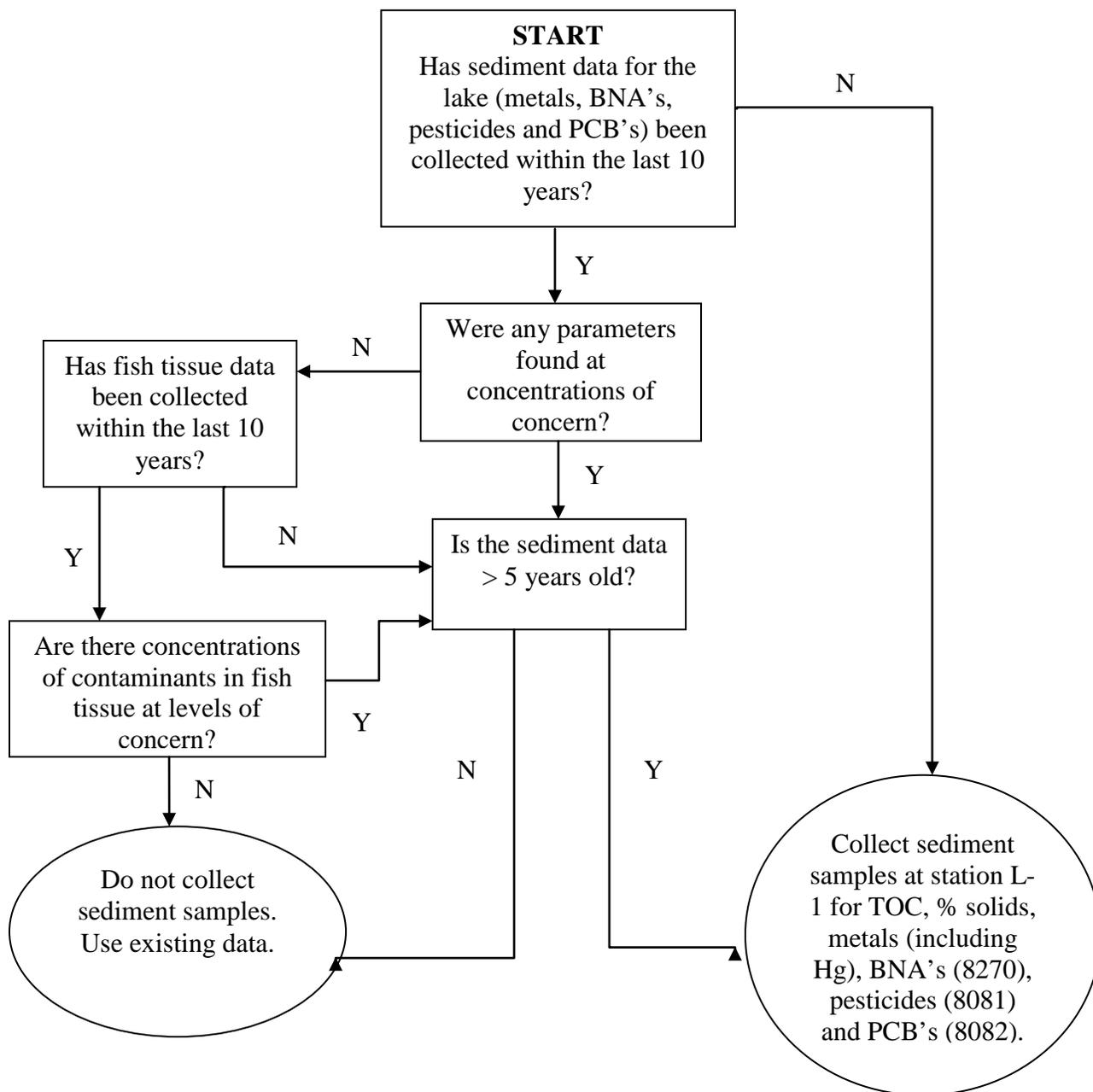
# ATTACHMENT 1

## Decision Matrices Sampling Flow Charts

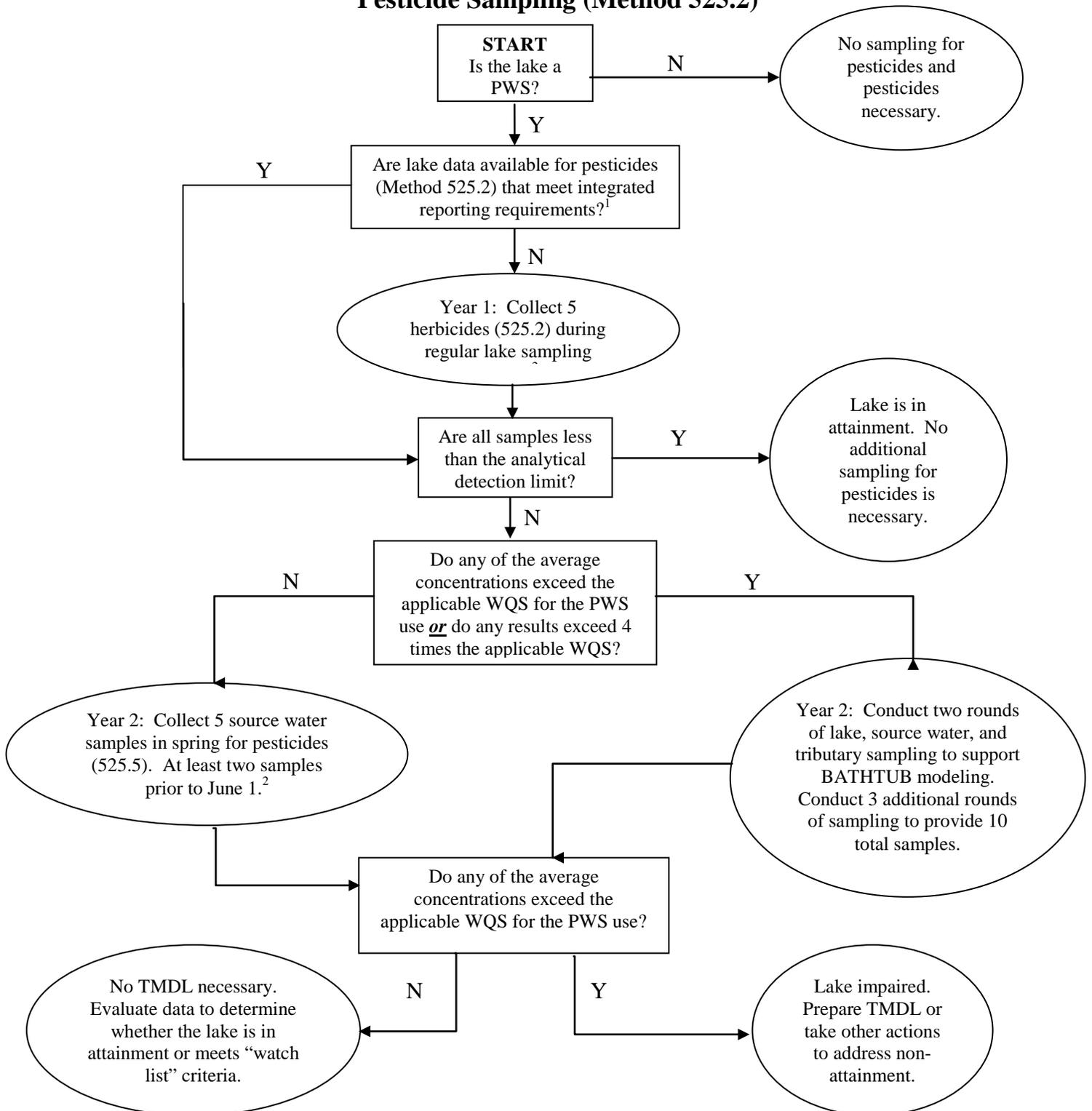
### Inland Lake Sampling Strategy Flow Chart



### Decision Flow Chart for Inland Lakes Sediment Sampling



### Decision Flow Chart for Inland Lakes Pesticide Sampling (Method 525.2)



<sup>1</sup> A total of 10 analytical results meeting credible data requirements.

<sup>2</sup> For public water supply lakes with known or suspected elevated pesticide concentrations, additional samples may be collected in the spring at the water intake if resources are available. For upground reservoirs, additional herbicide samples may also be collected at the associated stream source water intake.

## ATTACHMENT 2

# BATHTUB Methodology Sampling Profile Graphic And Flow Tracker Directions

## Supplement - BATHTUB Sampling Protocol

Initially, depth profile including temperature, pH, dissolved oxygen, and conductivity data must be collected at a maximum of 1 meter intervals. A thermocline exists if greater than 1°C change occurs within a depth change of 1 meter or less.

Determination of the existence of a thermocline is essential for proper sampling for modeling.

### Timing

Samples should be taken during growing season of May through September

Samples should be taken before lake turnover (loss of thermocline)

Samples must be taken between 10:00 am to 4:00 pm for the following:

Secchi transparency

Chlorophyll a for both streams and lakes

### Segmentation (choosing segments should be completed in cooperation with WQM staff)

Simplest configuration is one segment. Additional segments needed if:

Reservoir is greater than 20 km long

Interest in Trophic State Status of various locations in lake

Major inflows occurs within lake at different locations

### Sampling

#### LAKE

Unstratified (mixed without thermocline) reservoirs

One sample - Composite of three equivalent individual aliquot volumes

Surface (0.50 meter depth from surface)

Mid-depth

One meter from bottom

Note: Use of a Churn Sample Splitter to composite samples is described in Attachment 3.

Stratified (thermocline exists)

Three samples – Composite samples taken from each stratified layer

Epilimnion composite of three equivalent volume aliquots

Surface (0.50 meter depth from surface)

Epilimnion mid-depth

One meter from bottom of epilimnion

Metalimnion grab

Composite aliquots if needed for sufficient volume

Hypolimnion composite of three equivalent volume aliquots

One meter from top of hypolimnion

Hypolimnion mid-depth

One meter from bottom of reservoir

Note: All “surface samples” should be taken at a depth of 0.5 meter from the surface All aliquots must be composited into respective sample prior to filtering for Chlor a and Ortho P.

#### TRIBUTARY

- Measure influent stream flow same day as limnology work
- Grab sample same day as limnology work
  - Modeling Non-Metal Template
  - Ortho-P
  - Chlorophyll a

#### LAKE DISCHARGE

- Measure effluent stream flow same day as limnology work
- Grab sample same day as limnology work
  - Modeling Non-Metal Template
  - Ortho-P
  - Chlorophyll a

#### **Water quality components**

- Laboratory (for each respective sample from lake and stream)
  - Modeling Non-Metal Template
  - Chlor a
  - Ortho P
  - VSS
  - TOC

#### Field

- Temperature
- pH
- Conductivity
- Dissolved Oxygen
- Secchi Disk Transparency (lake only)
- Color (to be discussed)

Important points: After filtering Chl-a and using the buffer solution, the funnel should be rinsed three times with DI water to assure all algal cells make it to the filter. Apply the DI water to the sidewalls of the funnel with a thistle bottle then suction it through relaxing pressure just before drying. When switching from one sample to the next use a 10% HCl acid rinse then three DI rinses to assure the device is clean before the next filtering. Use chem-wipes as needed.

The filter for this should be GF/C with a 1.2 um pore size. Use the same cleaning procedure as above. It is possible to use the undiluted filtrate (before rinsing the funnel) from the Chlorophyll a sampling for Orthophosphate. This will expedite filtering through

the smaller pore Ortho-P filter. See Attachment 3 for instruction in how to use the syringe filtration method for Ortho-P and the type of filters to use.

### Stratified Lake Sampling

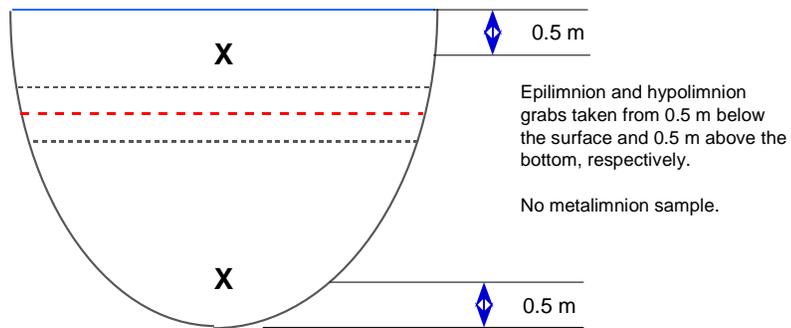
#### Standard Limnology Sampling

**Parameters:**

Field measurements at 0.5 m, then at 1.0 m increments.

Secchi disk transparency.

Analysis: Inland\_Lakes\_Water template



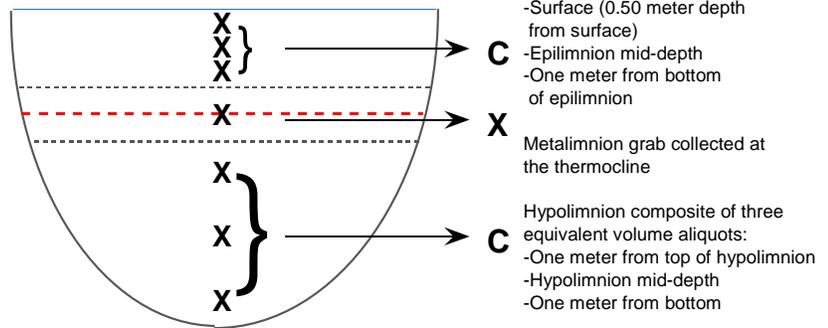
#### BATHTUB Model Sampling

**Parameters:**

Field measurements at 0.5 m, then at 1.0 m increments.

Secchi disk transparency.

Analysis: BATHTUB template



--- Thermocline  
**X** = Grab sample  
**C** = Spatial composite sample

## Flow Tracker Directions

For More Detailed Information go to:

[ftp://ksh.fgg.uni-lj.si/students/podipl/merska\\_oprema/Flow\\_Tracker\\_Manual.pdf](ftp://ksh.fgg.uni-lj.si/students/podipl/merska_oprema/Flow_Tracker_Manual.pdf)

### Quick Start

- Install the batteries (access the battery compartment from the back of the Flow Tracker).
- Turn the system on by holding the **On/Off** switch for 1 second; hold the switch for 4 seconds to turn the system off.
- Explore the **Setup Parameters** menu by pressing **1** from the **Main Menu**.
  - Press **Enter** to switch between the multiple display screens.
  - Use the menu items to change the parameters that affect data collection.
- Explore the **System Functions Menu** by pressing **2** from the **Main Menu**.
  - Press **Enter** to switch between the multiple display screens.
  - Use the menu items to access FlowTracker diagnostic procedures.
- Collect a test data set.
  - Select a data collection mode (general/discharge) from the **Setup Parameters Menu**.
  - Start the data run by pressing **3** from the **Main Menu**.
  - Follow the on-screen prompts. Use the **Next Station** and **Prev. Station** keys to scroll between stations. Use the **Set** keys to set various parameters.
  - See Sections 4 and 5 of the *FlowTracker Operation Manual* for a description of the General Mode and Discharge Mode data collection procedures.

### PC Software Installation

- The PC software is used to download data from the FlowTracker, to extract data to ASCII-text data files, and to perform detailed system diagnostics.
- Insert the FlowTracker Software CD into your computer's CD-ROM driver.
- An installation menu should automatically appear after the CD has been inserted.
  - If the installation window does not appear in a few seconds, click **Start/Run** and type `d:\install.exe` where `d:\` is the letter of your CD-ROM drive.
- On the menu, click the **FlowTracker Software Installation** button.
- Follow the on-screen installation instructions.
- See Section 6.1 of the *FlowTracker Operation Manual* for detailed instructions.

### Downloading Data Files from the FlowTracker

- Connect the power/communication cable from the FlowTracker to COM1 of your PC.
- Start the *FlowTracker* software using **Start/Programs/SonTek Software/FlowTracker**.
- Click **SonRecW** to launch the data download software.
- Click **Connect** to establish communication with the FlowTracker.
- Select one or more files from the downloaded recorder directory.

- Specify a destination directory for the downloaded files using the **Browse** button.
- Click **Download** to retrieve the files from the FlowTracker to your PC.
- See Section 6.4 of the *FlowTracker Operation Manual* for detailed instructions.

#### **Extacting Data from FlowTracker Data files**

- Start the FlowTracker software using **Start/Programs/SonTek Software/Flow Tracker**.
- Click **Data Export** to launch the data extraction software.
- Click **Open** and select a Flow/Tracker file to access.
- Click **Options** to specify the units system to use.
- Select a file type to output and click **Export Selected Variable** to create the specified file, or click **Export All Variables** to create all available output files.
- See Section 6.5 of the *FlowTracker Operation Manual* for detailed instructions.

#### **Basic FlowTracker data collection process, using the keypad interface**

- At the start of data collection, the user is prompted for a file name.
- For **Discharge** measurements, the user enters site-specific data before data collection: staff/gauge height (optional), rated flow (optional), and edge location data (required).
- At each measurement location, the user specifies location, water depth, and measurement depth data to document the data set. For **Discharge** measurements, these are used to calculate discharge in real-time.
- A fixed-length burst of velocity data is recorded at each measurement location. Velocity data is recorded once per second during the burst; mean velocity and quality control data are recorded at the end of each burst.
- Summary velocity and quality control data are displayed at the end of each measurement. The user is allowed to repeat individual measurements if desired.
- The user proceeds through a series of measurement locations (up to 100 stations can be recorded with each file.)
- The user can scroll through previous stations to view data and edit station information.
- When done, the user presses **End Section** to close the file. For **Discharge** measurements, the user enters ending-edge information and is then shown the final discharge data.

## ATTACHMENT 3

### Ortho P Syringe, Beta Bottle, Churn Splitter, Pump and Probe Procedures

## Ortho P Syringe Procedure

Use GF/C glass filter and a .45 micron cellulose filter sandwich using a minimum of 50-60 ml. The glass filters out the larger material and the cellulose filters the finer material.

Or:

### **Ortho-phosphate and Dissolved P (Syringe Filtration method):**

#### **Sampling supplies**

Whatman GMF 25 mm Luer-Lok 0.45 micron filter  
60 mL BD Luer-Lok syringe  
stock container (bucket, cubitainer)

#### **Method:**

- Collect sample in stock container  
If turbid, allow to settle a moment.
- Use syringe w/o filter, to draw the sample from top of stock container into the syringe by pulling the plunger outward until full.
- Tap the side of the syringe to free excess liquid, and attach the filter.
- Press plunger to push liquid through the filter into quart cubitainer. (You will need 50mL for the lab) The graduated syringe will allow you to easily know how much filtrate you have pushed through the filter.

**\*\*\* In samples that are sediment or algae laden, it is possible that the filter will clog prior to collecting 50mL. 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.**

- Finish collecting 50 mL.

**Note:** Ortho-phosphate has 2 day holding time and is unpreserved, Dissolved P is preserved (~2 drops (0.2 mL) H<sub>2</sub>SO<sub>4</sub> per 50 mL) and has 28 day holding time. Both must be kept on ice or chilled to 4 degrees.

- Rinse stock container or bucket before collecting new sample

Please save, but do not reuse syringes in the field. These can then be returned to CO from time to time. We will see that the used syringes are cleaned for re-use in later sampling events (Saving money and landfill space).

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## Wildlife Supply Company

### Operating Instructions for 1920-1940 Horizontal Beta™ Bottles

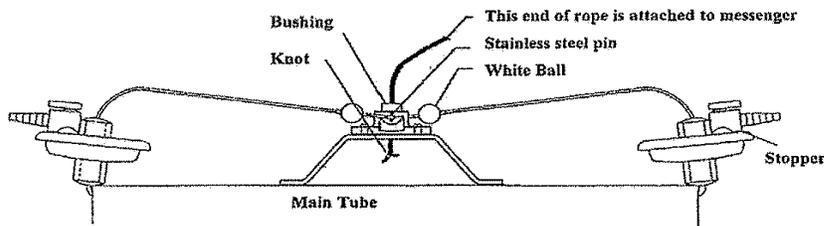
#### Safety:

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.



#### Recommended Accessories:

- 45-B10 11 oz. split messenger
- Messenger shock absorber 45-B40 for long air drops.
- 5 mm (3/16") dia line, or 3 mm (1/8") dia cable.
- Winches and winch mount.
- 910-G22 Plastic Carry Case
- 66-A50 Hand reel

#### Warranty and Parts:

We replace all missing or defective parts free of charge. All products guaranteed free from defect for 90 days. This guarantee does not include accident, misuse, or normal wear and tear and applies to original purchaser only.

95 Botsford Place, Buffalo, N.Y. 14216 U.S.A.

716-877-9518 • FAX 716-874-9853 • goto@wildco.com • www.wildco.com.com

Page 1

## INSTRUCTIONS



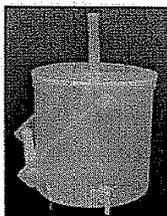
### Churn Sample Splitter

Catalog No. 37805-0004, 37805-0008, 37805-0014

The water-quality laboratory requires subsamples of a representative cross-section sample of rivers and streams for water-quality analysis. The cross-section sample is collected in 1-liter bottles or 1- or 8-liter bags using isokinetic samplers (for streamflow velocities > 1.5 feet per second) or four to nine verticals using the Equal Discharge Increment (EDI) technique or a minimum of 10 verticals using the Equal Width Increment (EWI) method (Edwards and Glysson, 1999). These samples are composited into one single representative cross-section sample of the streamflow. This composited sample can then be split, using the churn splitter, into the required representative subsamples as explained in the following procedure.

#### Procedure

This procedure is for the 14 liter Churn Sample Splitter. For smaller units, use fewer or smaller samples. This size sample splitter does not reliably produce representative water-sediment mixture subsamples when it contains less than 4 liters. The total sample volume is 8 to 14 liters, of which 4 to 10 liters are suitable for water-sediment mixture (unfiltered) subsamples. The remaining 4 or more liters may be used for filtered subsamples. Before starting to collect the representative sample of the streamflow, label all the subsample containers to be used and determine the total sample volume needed. Add an additional 10% to this sample volume to cover filter losses and spillage. Collect 2 to 4 liters of water and thoroughly rinse the churn splitter by swilling it and emptying the water out through the valve spigot. Determine the correct transit rate for the sampler being used and the volume of water to be collected at each vertical (U.S. Geological Survey, variously dated). Collect samples of a predetermined number of verticals. Only one sampler bottle or bag is used over and over again in collecting the cross-section samples in order to minimize the amount of sediment lost in transferring samples from the bottles to the churn splitter. Each time the bottle or bag is filled, the sample is poured into the splitter and the bottle is used again so that each succeeding sample washes the sediment left from the previous one into the splitter. Remember that the volume to be used for water-sediment mixture (unfiltered) subsamples must be "on top of" the 4 liters of sample in the tank from which representative water-sediment mixture subsamples cannot be obtained. When the required volume, plus 10% for waste, is in the churn splitter, move to a clean sample processing area and place all water-sediment mixture subsample containers within easy reach so that, once started, the stirring can be continuous. The largest volume subsample should be withdrawn first. The sample should be stirred at a uniform rate of approximately 9 inches per second by raising or lowering the churn paddle. As the volume in the tank decreases by withdrawing subsamples, the round-trip frequency should increase so that the churning disc velocity remains the same. The disc should touch the bottom of the tank on every stroke, and the stroke length should be as long as possible without brooking the water surface. Before using the churn sample splitter for the first time, practice this stroke using tap water. Observe as the stroke length and/or disc velocity is increased beyond the recom-



mended rate, there is a sudden change of sound and churning effort which is accompanied by the introduction of excessive air into the mixture. The introduction of excessive air into the sample is undesirable because it may change the dissolved gases, bicarbonate, pH, and other characteristics. On the other hand, inadequate stirring may result in non-representative subsamples. The sample in the churn splitter should be stirred at the uniform churning rate for about 10 strokes prior to the first withdrawal to establish the desired stirring rate of 9 inches per second and to assure uniform dispersion of the suspended matter. The churning must be continuous during the withdrawals. If a break in withdrawals is necessary, the stirring rate must be reestablished before continuing the withdrawals. The valve spigot should always be operated in the full open position. The operating lever is equipped with a positive stop

when fully open. When all of the required water-sediment mixture (unfiltered) subsamples have been obtained, the remaining portion of the sample is used, as necessary, for the filtered samples. It will be advantageous to allow the sediment to settle out in the mixing tank for a few minutes before processing the filtered subsamples. When all the necessary filtered subsamples have been obtained, all parts of the churn splitter should be cleaned thoroughly.

#### Cleaning

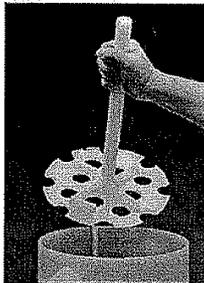
Cleaning in the laboratory includes the following steps: 1) soak for 30 minutes in a 0.1 to 2 percent non-phosphate, laboratory-grade detergent solution; 2) scrub with a non-metallic brush; 3) rinse well with tap water, passing some through the spigot; 4) (for trace-element samples) soak for 30 minutes in a 5 percent (by volume) trace-element grade hydrochloric acid solution; 5) rinse well with deionized water, passing some through the spigot; 6) place in doubled plastic bags.

Cleaning in the field between sites includes the following steps: 1) Rinse all surfaces with a 0.1 to 0.2 percent non-phosphate, laboratory grade detergent solution and allow to soak for about 10 minutes; 2) scrub with a non-metallic brush; 3) rinse well with tap water; 4) (for trace-element samples) using a wash bottle, rinse all surfaces with a 5 percent (by volume) trace-element grade hydrochloric acid solution; 5) rinse well with deionized water; 6) place in doubled plastic bags (U.S. Geological Survey, variously dated).

#### References:

Edwards, T.K. and Glysson, G. D., 1999, Field methods for measurement of fluvial sediment: U.S. Geological Survey Techniques of Water-Resources Investigations, book 3, chapter C2, available online at <http://water.usgs.gov/pubs/twri/twri3-c2/>

U.S. Geological Survey, variously dated, National field manual for the collection of water-quality data: U.S. Geological Survey Techniques of Water-Resources Investigations, book 9, chaps. A1-A9, available online at <http://pubs.water.usgs.gov/twri9A>.



## BEL-ART PRODUCTS

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10/01

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## Pump and Probe Procedures

### Water Column Profile Pump and Probe Methodology

If a multi-probe meter with sufficient cable length is not available for water column profile measurements, a pump attached to a hose is acceptable. Ohio EPA crafted a device that consists of a garden variety hose coupled with a 12 V submersible pump on the bottom end and a small plastic collection basin on the top end. The hose should be labeled with appropriate depth increments and constructed of a material that is rigid enough to prevent it from collapsing. The power leads from the pump should be fastened to the hose to minimize tangling and facilitate connection to the power source. In previous prototypes the collection basin is constructed of PVC and is equipped with an overflow tube. Ideally, the basin should fix to the rail of the sampling vessel so the overflow discharges back into the lake. The basin needs to be large enough to hold an assortment of probes that might be used to take measurements. Once the pump is lowered to the desired depth and engaged, sufficient time should be allowed for water in the basin to exchange and for the meter readings to stabilize before they are logged.

# ATTACHMENT 4

## Forms and Labels

**OhioEPA** Division of Environmental Services

**Report for Test Schedule INLAND\_LAKES\_WATER**

Modified On **7/16/1998 07:39:08** Modified By **LFRIEDMAN**

Description **Template for DSW SFY 99 inland lakes water samples--inorganic analysis**

Group Name **INORGANIC**

Analysis / Schedule	Instrument	Replicates	Standard	Analysis
Ammonia		1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Conductivity		1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
ICP_1		1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
ICPMS_1		1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Nitrate		1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Nitrite		1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
pH		1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Sol_Tot_Vol		1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Solids_Diss		1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Solids_Susp		1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Solids_Tot		1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Sulfate		1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
TKN		1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
TOC		1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
TP		1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

**Lake Sampling Data Sheet**

Lake Name: \_\_\_\_\_

Station ID: \_\_\_\_\_

Lat/Long: \_\_\_\_\_

Collected By: \_\_\_\_\_

Date/Time: \_\_\_\_\_

Secchi Depth (m): \_\_\_\_\_

Max. Depth: \_\_\_\_\_

Management: \_\_\_\_\_

**Water Color**

clear lt grn very grn gr/br lt brn very brn

**Cloud Cover**

clear hazy few clouds many clouds overcast

**Waves**

calm ripples mod waves white caps

**Air Temperature (F)**

40-50 50-60 60-70 70-80 80-90 90+

**Wind Condition**

calm light breeze strong breeze gusty

**Wind Direction**

N NE E SE S SW W NW

**Recreational Use**

none light moderate heavy

Zebra Mussels Y, N

Bluegreen Algae Y, N

**Comments:**

Conductivity values corrected to 25°C? Y , N

Profile					
Depth (m)	Temp (°C)	Cond. (µmhos/cm)	D.O. (%sat.)	D.O. (mg/l)	pH (S.U.)
0.5 (Surface)					
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					

ATTACHMENT 6 to Appendix B

DES Use Only  
 Sample# \_\_\_\_\_  
 MM DD YY  
 Date Received: / /

**OhioEPA** Division of Environmental Services  
**Inorganics Sample Submission Form**  
 DW Certification #410

Client (Bill To): DSW  
 Special Project Identity: \_\_\_\_\_  
 (Project identity requires prior approval )

Division: **DSW** OEPA District: **NEDO**  
 Sample Type: **Survey** Matrix: **Surface Water**

Collection Date: MM/DD/YYYY HH MM  
 Grab Begin 02/13/2008  
 End \_\_\_\_\_

Frequency Duration of Composite Sample: \_\_\_\_\_

Container Information			Field QC
Qty	Type	Pres.	
	Air Filter		MSD 0 Collected By: Anderson, Paul Customer ID#: 08PWA0213 External ID#: 01040421 Referred By _____ Station ID#: OH0124-348 County: Stark
1	Cubtainer NaOH		
	Cubtainer HNO3		
	Cubtainer HNO3 Filtr		
1	Cubtainer H2SO4		
	Cubtainer H2SO4 Filtr		
1	Cubtainer NP		
	Cubtainer NP Filtr		
	Jar H2SO4 Phenol		
	Jar H2SO4 CG		
	Sed Frozen		
	Sed		
	Bacteria Sterile		

Sample Location: **17 - DEER CREEK RESERVOIR L-1**

Barcode:  \* 0 1 0 4 0 4 2 1 \*

**Template: Inland\_Lakes\_Water**

<b>Demand</b>	<b>Nutrients</b>
<input type="checkbox"/> % Solids, Sed only	<input type="checkbox"/> Acidity, Total CaCO3
<input type="checkbox"/> BOD-20 day	<input type="checkbox"/> Alkalinity Total CaCO3
<input type="checkbox"/> BOD-5 day	<input type="checkbox"/> Bicarbonate
<input type="checkbox"/> BOD-Ulimate	<input type="checkbox"/> Chloride
<input type="checkbox"/> CBOD-20 day	<input type="checkbox"/> COD
<input type="checkbox"/> CBOD-5 day	<input type="checkbox"/> Chromium, Hexavalent (NP_Fil)
<input type="checkbox"/> CBOD-Ulimate	<input type="checkbox"/> Cyanide_Free (WAD)
<input type="checkbox"/> Conductivity	<input type="checkbox"/> Cyanide_Total
<input type="checkbox"/> Flashpoint	<input type="checkbox"/> Fluoride
<input type="checkbox"/> Oil/Grease	<input type="checkbox"/> LL Phosphorus, Total
<input type="checkbox"/> Particle Size, Sed only	<input type="checkbox"/> LL Phosphorus, Dissolved (Fil)
<input type="checkbox"/> pH	<input type="checkbox"/> Nitrite
<input type="checkbox"/> Solids_Des(Fil)	<input type="checkbox"/> Ammonia/Nitrate+nitrite
<input type="checkbox"/> Solids_Susp(nonfil)	<input type="checkbox"/> Phenolics, Total
<input type="checkbox"/> Solids_Total	<input type="checkbox"/> Phenolics, Total w/mn dist.
<input type="checkbox"/> Solids_Total Volatile	<input type="checkbox"/> Phosphorus, Dissolved (Fil)
<input type="checkbox"/> TDS	<input type="checkbox"/> Sulfate
<input type="checkbox"/> TOC	<input type="checkbox"/> TKN / Phosphorus, Total
<b>Microbiology</b>	<b>Misc.</b>
<input type="checkbox"/> E. coli	<input type="checkbox"/> Turbidity
<input type="checkbox"/> Fecal Coliform	<input type="checkbox"/> _____
<input type="checkbox"/> Fecal Streptococcus	<input type="checkbox"/> _____
<input type="checkbox"/> MMCO-MUG	<input type="checkbox"/> _____
<input type="checkbox"/> Total Coliform	<input type="checkbox"/> _____
<input type="checkbox"/> EC / EN / QTRAY	<input type="checkbox"/> _____
<b>Metals</b>	
<input type="checkbox"/> ICP 1, Water only (Al,Ba,Ca,Cr,Cu,Fe,Mg,Mn,Na,Ni,K,Sr,Zn,Hardness)	
<input type="checkbox"/> ICP 2, Water only (Ca,Mg,Hardness)	
<input type="checkbox"/> ICP 3, Sediment Only (Al,Ba,Ca,Cr,Cu,Fe,Mg,Mn,Na,Ni,K,Sr,Zn,Pb)	
<input type="checkbox"/> ICP 4, SW846 only (Al,Ba,Ca,Cr,Cu,Fe,Mg,Mn,Na,Ni,K,Sr,Zn,V,Cd,Cs,Tl,Ba,Hardness)	
<input type="checkbox"/> ICP 5, SW846 SED only (Al,Ba,Ca,Cr,Cu,Fe,Mg,Mn,Na,Ni,K,Pb,Sr,Zn,V,Cd,Tl,Ba)	
<input type="checkbox"/> ICP 6, Air Filters only (Cr,Ni,Pb,Zn,Mn)	
<input type="checkbox"/> Vanadium	
<input type="checkbox"/> Titanium	
Single ICP Metals Or GFAA - Please list only if not using Metals packages above	
<input type="checkbox"/> _____	<input type="checkbox"/> _____
<input type="checkbox"/> _____	<input type="checkbox"/> _____
<input type="checkbox"/> _____	<input type="checkbox"/> _____
<input type="checkbox"/> _____	<input type="checkbox"/> _____
<b>Metals-Low Level</b>	
<input type="checkbox"/> SIMA 1, Water only (As,Cd,Pb,Se),LL	
<input type="checkbox"/> SIMA 2, Sed only (As,Cd,Se),LL	
<input type="checkbox"/> SIMA 3, Air only (As,CdE),LL	
<input type="checkbox"/> Arsenic, SW846 only, L L	
<input type="checkbox"/> Cadmium, SW846 only, L L (Sed only)	
<input type="checkbox"/> Lead, SW846 only, L L	
<input type="checkbox"/> Selenium, SW846 only, L L	
The following require prior notification to DES before submital:	
<input type="checkbox"/> Antimony, L L	
<input type="checkbox"/> Beryllium, L L, Water, Sed, & Air only	
<input type="checkbox"/> Cobalt, L L, Water, Sed, & Air only	
<input type="checkbox"/> Copper L L, Water only	
<input type="checkbox"/> Silver, L L	
<input type="checkbox"/> Thallium, L L	
<input type="checkbox"/> Tin, L L	
<input type="checkbox"/> Mercury	<input type="checkbox"/> Bioassay <input type="checkbox"/>

Field Comments									Lab Comments	
Surface										
Chlorine, mg/L P5090	Cond, umho/cm P94	DO, mg/L P256	Flow, cfs P61	Gage H/L P85	pH, su P400	% Sat	Temp, C P10	Corr. Cond, umho/cm P94		

## OhioEPA Division of Environmental Services

**Inorganics Sample Submission Form**  
DW Certification #410

DES Use Only

Sample# \_\_\_\_\_

MM DD YY

Date Received: / /

Client (Bill To): DSW Special Project Identity: _____ <small>(Project Identity requires prior approval)</small> Division: <b>DSW</b> OEPA District: <b>NEDO</b> Sample Type: <b>Survey</b> Matrix: <b>Surface Water</b>		Template: <b>Inland_Lakes_Water</b> <b>Demand</b> <input type="checkbox"/> % Solids, Sed only <input type="checkbox"/> BOD-20 day <input type="checkbox"/> BOD-5 day <input type="checkbox"/> BOD-Ultimate <input type="checkbox"/> CBOD-20 day <input type="checkbox"/> CBOD-5 day <input type="checkbox"/> CBOD-Ultimate <input type="checkbox"/> Conductivity <input type="checkbox"/> Flashpoint <input type="checkbox"/> Oil/Grease <input type="checkbox"/> Particle Size, Sed only <input type="checkbox"/> pH <input type="checkbox"/> Solids_Diss(FT) <input type="checkbox"/> Solids_Susp(nonfit) <input type="checkbox"/> Solids_Total <input type="checkbox"/> Solids_Total Volatile <input type="checkbox"/> TOC <b>Microbiology</b> <input type="checkbox"/> E. coli <input type="checkbox"/> Fecal Coliform <input type="checkbox"/> Fecal Streptococcus <input type="checkbox"/> MFC-MUG <input type="checkbox"/> Total Coliform <input type="checkbox"/> EC / EN / QTRAY <b>Metals</b> <input type="checkbox"/> ICP 1, Water only (Al,Ba,Ca,Cr,Cu,Fe,Mg,Mn,Na,Ni,K,Sr,Zn,Hardness) <input type="checkbox"/> ICP 2, Water only (Ca,Mg,Hardness) <input type="checkbox"/> ICP 3, Sediment Only (Al,Ba,Ca,Cr,Cu,Fe,Mg,Mn,Na,Ni,K,Sr,Zn,Pb) <input type="checkbox"/> ICP 4, SWB46 only (Al,Ba,Ca,Cr,Cu,Fe,Mg,Mn,Na,Ni,K,Sr,Zn,V,Cd,Co,Ti,Ba,Hardness) <input type="checkbox"/> ICP 5, SWB46 SED only (Al,Ba,Ca,Cr,Cu,Fe,Mg,Mn,Na,Ni,K,Pb,Sr,Zn,V,Co,Ti,Ba) <input type="checkbox"/> ICP 6, Air Filters onl (Cr,Ni,Pb,Zn,Mn) <input type="checkbox"/> Vanadium <input type="checkbox"/> Titanium Single ICP Metals Or GFAA - Please list only if not using Metals packages above <input type="checkbox"/> _____ <input type="checkbox"/> _____ <input type="checkbox"/> _____ <input type="checkbox"/> _____ <b>Metals-Low Level</b> <input type="checkbox"/> SIMA 1, Water only (As,Cd,Pb,Se),LL <input type="checkbox"/> SIMA 2, Sed only (As,Cd,Se),LL <input type="checkbox"/> SIMA 3, Air only (As,CDE),LL <input type="checkbox"/> Arsenic, SWB46 only, L L <input type="checkbox"/> Cadmium, SWB46 only, L L (Sed only) <input type="checkbox"/> Lead, SWB46 only, L L <input type="checkbox"/> Selenium, SWB46 only, L L The following require prior notification to DES before submittal: <input type="checkbox"/> Antimony, L L <input type="checkbox"/> Beryllium, L L, Water, Sed, & Air only <input type="checkbox"/> Cobalt, L L, Water, Sed, & Air only <input type="checkbox"/> Copper L L, Water only <input type="checkbox"/> Silver, LL <input type="checkbox"/> Thallium, L L <input type="checkbox"/> Tin, LL <input type="checkbox"/> Mercury																																														
Collection Date: MM / DD / YYYY HH MM Grab      Begin 02/13/2008 End _____		Frequency: _____ Duration of Composite Sample: _____																																														
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="2">Container Information</th> <th>Field QC</th> </tr> <tr> <th>Qty</th> <th>Type Pres.</th> <th></th> </tr> </thead> <tbody> <tr> <td></td> <td>Air Filter</td> <td>MSD <input type="checkbox"/></td> </tr> <tr> <td>1</td> <td>Cubitainer NaOH</td> <td>Collected By: Anderson, Paul</td> </tr> <tr> <td>1</td> <td>Cubitainer HNO3</td> <td>Customer ID#: 08PWA0213</td> </tr> <tr> <td></td> <td>Cubitainer HNO3 Fit</td> <td>External ID#: 01040422</td> </tr> <tr> <td>1</td> <td>Cubitainer H2SO4</td> <td>Referred By</td> </tr> <tr> <td></td> <td>Cubitainer H2SO4 Fit</td> <td>Station ID#: OH0124-348</td> </tr> <tr> <td>1</td> <td>Cubitainer NP</td> <td></td> </tr> <tr> <td></td> <td>Cubitainer NP_Fit</td> <td></td> </tr> <tr> <td></td> <td>Jar H2SO4_Phenol</td> <td></td> </tr> <tr> <td></td> <td>Jar H2SO4_OG</td> <td></td> </tr> <tr> <td></td> <td>Sed Frozen</td> <td></td> </tr> <tr> <td></td> <td>Sed</td> <td></td> </tr> <tr> <td></td> <td>Bacteria Sterile</td> <td></td> </tr> </tbody> </table>		Container Information		Field QC	Qty	Type Pres.			Air Filter	MSD <input type="checkbox"/>	1	Cubitainer NaOH	Collected By: Anderson, Paul	1	Cubitainer HNO3	Customer ID#: 08PWA0213		Cubitainer HNO3 Fit	External ID#: 01040422	1	Cubitainer H2SO4	Referred By		Cubitainer H2SO4 Fit	Station ID#: OH0124-348	1	Cubitainer NP			Cubitainer NP_Fit			Jar H2SO4_Phenol			Jar H2SO4_OG			Sed Frozen			Sed			Bacteria Sterile		Sample Location: _____ County: Stark <b>18 - DEER CREEK RESERVOIR L-1</b>  <p style="font-size: small;">* 0 1 0 4 0 4 2 2 *</p>	
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DES Use Only

Sample # \_\_\_\_\_  
 MM DD YY

Date Received / /

Sample Information	Parameters																																																												
<p><b>Client (Bill to)</b> <u>DSW - BATHUB</u></p> <p><b>Project Identity</b>                      (project identity requires prior approval)  <b>No Folder</b> <input type="checkbox"/></p> <p><b>Division (check one)</b>      <b>OEPA District (check one)</b></p> <p>DAPC <input type="checkbox"/>      CO <input type="checkbox"/>                      DDAGW <input type="checkbox"/>      CDO <input type="checkbox"/>                      DERR <input type="checkbox"/>      NEDO <input type="checkbox"/>                      DHWM <input type="checkbox"/>      NWDO <input type="checkbox"/>                      DSW <input type="checkbox"/>      SEDO <input type="checkbox"/>                      DSIWM <input type="checkbox"/>      SWDO <input type="checkbox"/>                      Other _____      Other _____</p> <p><b>Sample Type (check one)</b>      <b>Matrix (check one)</b></p> <p>Ambient <input type="checkbox"/>      Air Filter <input type="checkbox"/>                      Complaint <input type="checkbox"/>      Drinking water <input type="checkbox"/>                      Compliance <input type="checkbox"/>      Ground water <input type="checkbox"/>                      Litigation <input type="checkbox"/>      Sediment <input type="checkbox"/>                      Survey <input type="checkbox"/>      Surface water <input type="checkbox"/>                      Raw <input type="checkbox"/>      Waste water <input type="checkbox"/>                      Plant <input type="checkbox"/>      Reagent Water <input type="checkbox"/>                      Distribution <input type="checkbox"/>      Other _____                      Other <u>BATHUB</u></p> <p><b>Collection Date</b>      MM    DD    YY    HH    MM</p> <p>Grab <input type="checkbox"/>      /    /    /    /    /                      (or)                      Composite <input type="checkbox"/>    Begin / / / / /                      End / / / / /</p> <p>Frequency &amp; Duration of Composite Sample:</p> <table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th>Qty.</th> <th>Type</th> <th>Pres.</th> <th>Field QC (Check one)</th> </tr> </thead> <tbody> <tr> <td></td> <td>Air Filter</td> <td></td> <td>Field Duplicate <input type="checkbox"/></td> </tr> <tr> <td></td> <td>Cubitaoner</td> <td>NaOH</td> <td>Field/Equip/Acid Blank <input type="checkbox"/></td> </tr> <tr> <td></td> <td>Cubitaoner</td> <td>HNO<sub>3</sub></td> <td>MSD <input type="checkbox"/></td> </tr> <tr> <td></td> <td>Cubitaoner</td> <td>HNO<sub>3</sub> Filt</td> <td></td> </tr> <tr> <td></td> <td>Cubitaoner</td> <td>H<sub>2</sub>SO<sub>4</sub></td> <td></td> </tr> <tr> <td></td> <td>Cubitaoner</td> <td>H<sub>2</sub>SO<sub>4</sub> Filt</td> <td></td> </tr> <tr> <td></td> <td>Cubitaoner</td> <td>N/P</td> <td></td> </tr> <tr> <td></td> <td>Cubitaoner</td> <td>N/P Filt</td> <td></td> </tr> <tr> <td></td> <td>Jar</td> <td>H<sub>2</sub>SO<sub>4</sub> Phenol</td> <td></td> </tr> <tr> <td></td> <td>Jar</td> <td>H<sub>2</sub>SO<sub>4</sub> O&amp;G</td> <td></td> </tr> <tr> <td></td> <td>Sed</td> <td>Frozen</td> <td></td> </tr> <tr> <td></td> <td>Sed</td> <td></td> <td></td> </tr> <tr> <td></td> <td>Bacteria</td> <td>Sterile</td> <td></td> </tr> <tr> <td></td> <td><u>Filter MgCO<sub>3</sub></u></td> <td></td> <td></td> </tr> </tbody> </table> <p>Collected By _____                      Customer ID # _____                      Station ID # _____                      County: _____</p>	Qty.	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Qty.	Type	Pres.	Field QC (Check one)																																																										
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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

**OhioEPA** Division of Environmental Services

**Report for Test Schedule BATHTUB**

Modified On 5/30/2008 16:12:28 Modified By RKHIDEKEL  
 Description Samples submitted by DSW WQ staff for "Bathtub" lake modeling.  
 Group Name

Analysis / Schedule	Instrument	Replicates	Standard	Analysis
Acidity		1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Alkalinity		1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Ammonia		1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Carb_Bicarb		1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
CBOD-20		1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
CHL-A-PHE-A		1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Chloride		1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Nitrate		1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Nitrite		1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Orthophosphate		1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Solids_Diss		1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Solids_Susp		1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Solids_Susp_Vol		1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Sulfate		1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
TKN		1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
TOC		1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
TP		1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>



### PLANKTON LABELS

  
**DATE:** \_\_\_\_\_  
**DISTRICT:** CDO NEDO NWDO SEDO  
SWDO  
**LAKE:** \_\_\_\_\_  
\_\_\_\_\_  
**EA3 Station:** \_\_\_\_\_ **STA:** L-1  
L-2  
**SAMPLE DEPTH(S):** \_\_\_\_\_ TO \_\_\_\_\_ m  
**PRESERVATIVE:** Lugols 70% EtOH  
Other  
**COLLECTION METHOD:** Int. Tube

  
**DATE:** \_\_\_\_\_  
**DISTRICT:** CDO NEDO NWDO SEDO  
SWDO  
**LAKE:** \_\_\_\_\_  
\_\_\_\_\_  
**EA3 Station:** \_\_\_\_\_ **STA:** L-1  
L-2  
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**DATE:** \_\_\_\_\_  
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SWDO  
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\_\_\_\_\_  
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L-2  
**SAMPLE DEPTH(S):** \_\_\_\_\_ TO \_\_\_\_\_ m  
**PRESERVATIVE:** Lugols 70% EtOH  
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**DATE:** \_\_\_\_\_  
**DISTRICT:** CDO NEDO NWDO SEDO  
SWDO  
**LAKE:** \_\_\_\_\_  
\_\_\_\_\_  
**EA3 Station:** \_\_\_\_\_ **STA:** L-1  
L-2  
**SAMPLE DEPTH(S):** \_\_\_\_\_ TO \_\_\_\_\_ m  
**PRESERVATIVE:** Lugols 70% EtOH  
Other  
**COLLECTION METHOD:** Int. Tube

  
**DATE:** \_\_\_\_\_  
**DISTRICT:** CDO NEDO NWDO SEDO  
SWDO  
**LAKE:** \_\_\_\_\_  
\_\_\_\_\_  
**EA3 Station:** \_\_\_\_\_ **STA:** L-1  
L-2  
**SAMPLE DEPTH(S):** \_\_\_\_\_ TO \_\_\_\_\_ m  
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**COLLECTION METHOD:** Int. Tube

  
**DATE:** \_\_\_\_\_  
**DISTRICT:** CDO NEDO NWDO SEDO  
SWDO  
**LAKE:** \_\_\_\_\_  
\_\_\_\_\_  
**EA3 Station:** \_\_\_\_\_ **STA:** L-1  
L-2  
**SAMPLE DEPTH(S):** \_\_\_\_\_ TO \_\_\_\_\_ m  
**PRESERVATIVE:** Lugols 70% EtOH  
Other  
**COLLECTION METHOD:** Int. Tube



**17 - DEER CREEK  
RESERVOIR L-1  
SURFACE  
H2SO4**



**17 - DEER CREEK  
RESERVOIR L-1  
SURFACE  
HNO3**



**17 - DEER CREEK  
RESERVOIR L-1  
SURFACE  
NP**



**17 - DEER CREEK  
RESERVOIR L-1  
SURFACE  
FILTERED + H<sub>2</sub>SO<sub>4</sub>**



**18 - DEER CREEK  
RESERVOIR L-1  
Bottom  
H2SO4**



**18 - DEER CREEK  
RESERVOIR L-1  
Bottom  
HNO3**



**18 - DEER CREEK  
RESERVOIR L-1  
Bottom  
NP**



**18 - DEER CREEK  
RESERVOIR L-1  
Bottom  
FILTERED + H<sub>2</sub>SO<sub>4</sub>**



**19 - DEER CREEK  
RESERVOIR L-1 Dup - A  
Composite  
H2SO4**



**19 - DEER CREEK  
RESERVOIR L-1 Dup - A  
Composite  
NP**



**19 - DEER CREEK  
RESERVOIR L-1 Dup - A  
Composite  
FILTERED - H<sub>2</sub>SO<sub>4</sub>**



**20 - DEER CREEK  
RESERVOIR L-1 Dup - B  
Composite  
H2SO4**



**20 - DEER CREEK  
RESERVOIR L-1 Dup - B  
NP**



**20 - DEER CREEK  
RESERVOIR L-1 Dup - B  
Composite  
FILTERED - H<sub>2</sub>SO<sub>4</sub>**

# ATTACHMENT 5

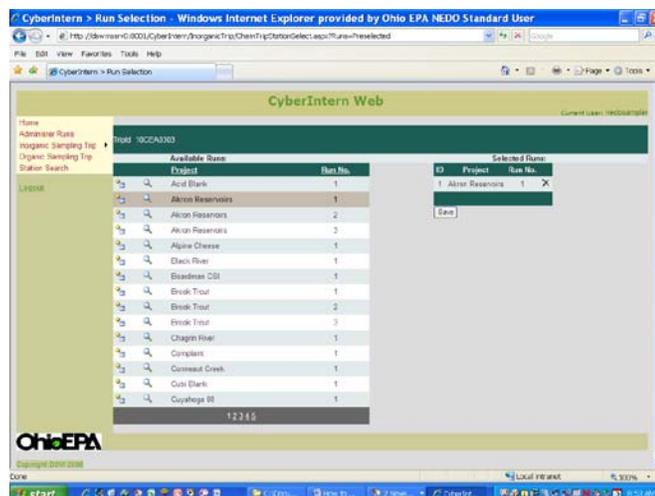
## CyberIntern Procedures

## How-To for Lakes Sampling in CyberIntern

[a.k.a. creation of multiple field forms for the same station for the same sampling trip]

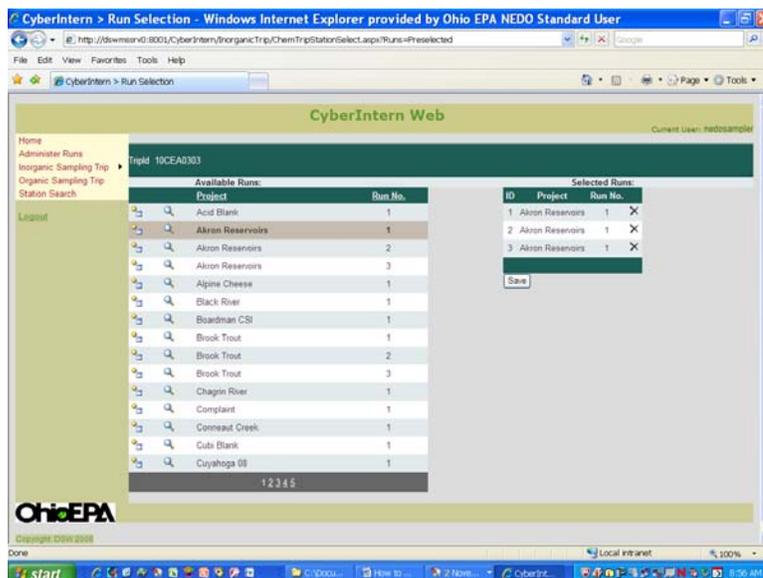
1. Create a "Survey" for Inland Lakes Sampling. Each lake can be an individual survey, or a master survey (e.g. "CDO Inland Lakes") can be used.
2. Create a separate "Run" for each of the sampling stations using the "Administration of Runs" program in CyberIntern. Save the "Run" and exit "Administration of Runs".
  - ◆ NOTE: it is not possible to use two instances for the same station when creating a "run" within a "survey". That's OK.
  - ◆ If you have more than one sampling point (e.g. a beach or boat ramp site) and you will not be collecting from multiple depths at the other location(s), create a separate "run" for the location(s) in your "survey". Do not include it with your L-1 site in a "run" [this will prevent the creation of multiple sets of paperwork for stations where only the surface will be sampled].
  - ◆ Since we will be sampling more often using the Inland\_Lakes\_Water template, use it as the default for the L-1 site. For locations where only bacteria will be collected, use the "-" (no template) option and check off parameters and container types on the sample submission form manually.
  - ◆ The system is now ready for the creation of trips.
3. Create a new "Trip" under the "Generate a New Trip" program in CyberIntern.
4. After entering the sampling information (date, division, location, crew leader, additional samplers, vehicle, and type of sampling), select the "Run" from the pick list (e.g. "Inland Lakes-NEDO" Run 1). This will give 1 instance of the "Run" in the "Chosen Run(s)" field.

Example:



- To allow for sampling at multiple depths, repeat picking the same “Run” as many times as necessary to give the number of instances needed in the “Chosen Run(s)” field (e.g., for surface, metalimnion, and hypolimnion samples, create 3 instances of the “Run”).

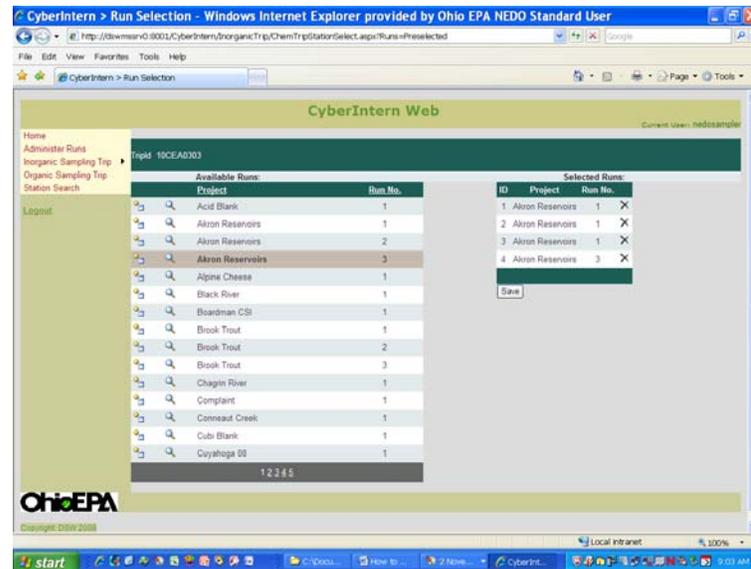
Example (creation of a BATHTUB run for a lake, three instances of the same run selected – this will allow sampling at three depths):



- NOTE 1: this **does not** equate to creating a field duplicate. As with any sampling run, duplicates should be created by checking the “Field Duplicate” check box on the “Trip Creator” form.

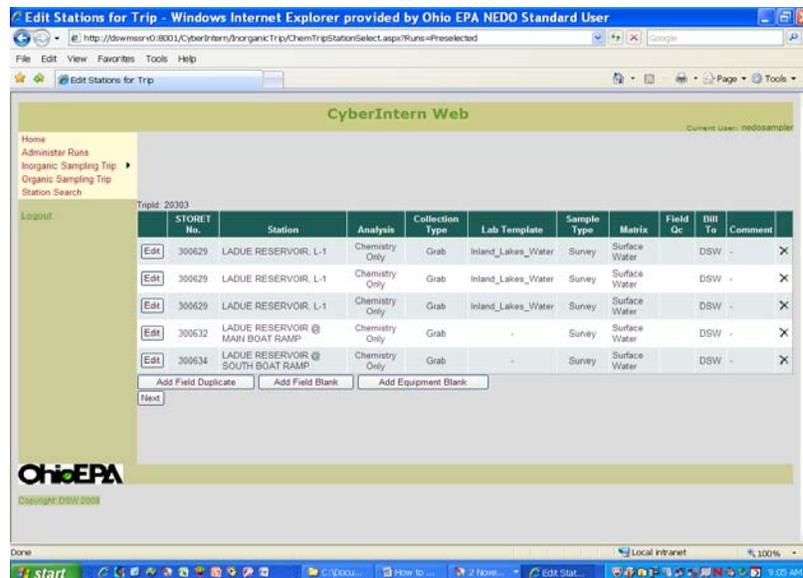
- ◆ NOTE 2: for BATHTUB sampling select your L-1 station run three times when creating the trip (epilimnion, metalimnion, hypolimnion).
- ◆ NOTE3: when sampling multiple lakes, repeat the procedure to provide the correct number of instances for that lake as well.
- ◆ NOTE4: if a bacteria only site is included in the trip, select that run only once.

Example (bacteria site run added to the list):



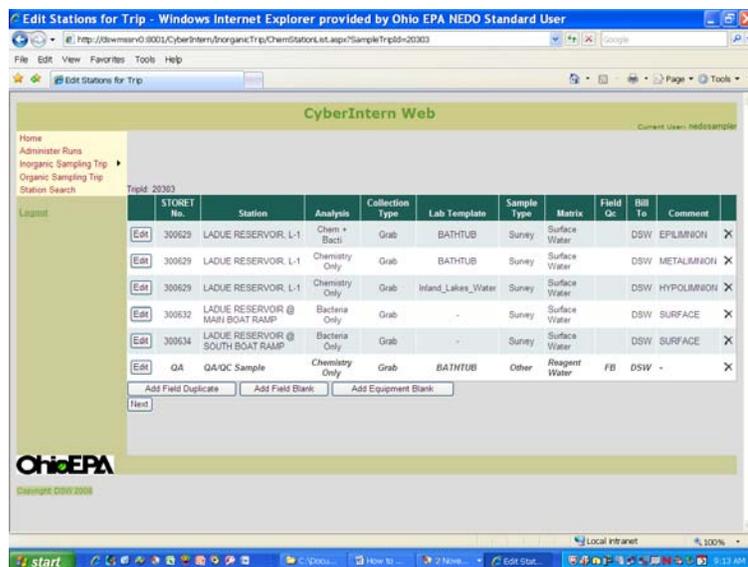
6. Hit "Save" to proceed to the site-specific window.
7. The list of stations, template information, sample type (grab or composite), and "bill to", and "comments" (**VERY IMPORTANT**) information for each sample can now be modified.

Example (starting window for editing the sites):



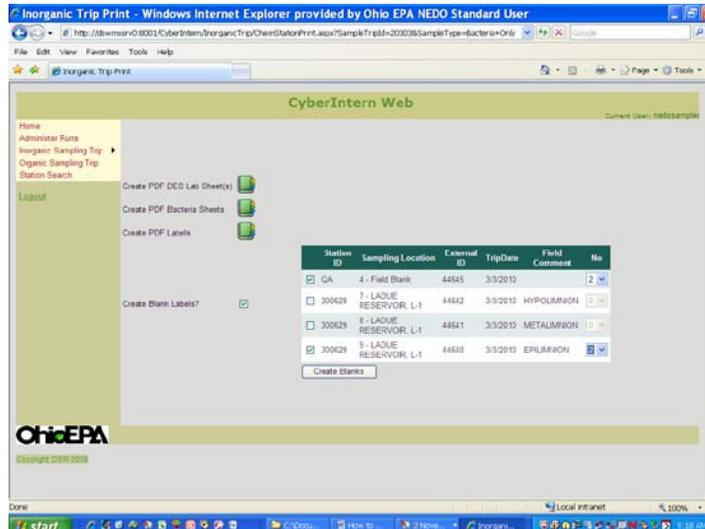
- ◆ For BATHTUB samples, change the template to “BATHTUB”
- ◆ Note that the “Analysis” column may need to be changed to reflect the addition or subtraction of chemistry samples, bacteria samples, or both.
- ◆ **The depth of sample collection should be added at this stage in the “comments” column to differentiate the samples.**
- ◆ Add field dups or blanks at this stage as with any other trip.

Example (completed trip creation page – note: field blank added):



8. Hit the “Next” button to proceed to lab sheet creation.
9. **IMPORTANT:** Make sure to create any extra labels needed for chlorophyll prior to finalization of the sheet/label creation.

Example (screen for creation of blank labels – create as many as needed for the trip – in the example, two additional labels were created for chlorophyll for the epilimnion and the field blank)



10. Create the pdf files, print sheets and labels.

11. Go enjoy your day in the field!

## ATTACHMENT 6

# Harmful Algal Bloom (HAB) and Algal Toxin Sampling and Processing Procedures

## **Algal Toxin Sampling and Processing Procedures - 2010**

### **Materials, Sample Collection, Preservation, Shipping, Processing:**

#### Materials:

- Plastic gloves to the shoulder (to protect skin from toxin irritation)
- Chest Waders – if collecting samples by wading off the shore
- One or more 500 ml amber glass jar(s)(or quart cubitainers) for raw water – Bring extras for each sampling station.
- One 4-6 ounce amber glass jar for finished water-Bring extras
- Yardstick or weighted measuring tape
- Digital camera to record appearance of bloom
- GPS
- Multi-probe sampler
- Cooler with ice or ice packs
- Sturdy padded shipping box or small cooler.
- Quart size Zip Lock bags (two for each sample – double sealed)
- Large size Zip Lock bags (to contain ice – double sealed) or Ice Packs
- Fed X or UPS shipping labels (if UPS, use the 400473 shipping code)

Address to:

T. Mike Sudman Jr.  
Supt. of Water & Distr.  
Celina Utilities - Water Dept.  
714 S. Sugar Street  
Celina, Ohio 45822  
Ph 419-586-2270  
Fax 419-586-3598  
Cell 419-733-4112

#### **SAFETY PRECAUTIONS:**

Gloves (preferably shoulder length) should be worn when dealing with algal “scums” or anytime you are collecting a sample from an algae bloom. Waders should also be worn if collecting an algal toxin sample when wading off the shore to protect skin from contact with algal toxins. Algal toxins are volatile. Avoid inhaling spray and minimize inhalation of volatilized toxin associated with harmful algal blooms.

### Preparation for Collection:

Check with the Inland Lakes Program / HAB Coordinator (614-644-2135) before collecting any algae toxin sample to ensure funding is available for shipping and processing. Let the Coordinator know when you will be collecting the algal toxin samples and when you will be shipping them to the Celina PWS laboratory. If you cannot contact the Inland Lakes Program/HAB Coordinator, collect the sample(s) and freeze them until you get clearance to have the sample(s) shipped and processed. If there is a PWS at the lake you are sampling, contact the PWS operator and the district drinking water staff **prior** to collecting algal toxin samples. Let them know that you will be collecting a raw water sample near the intake and make arrangements to collect a finished water sample on the same day. Contact the Celina PWS operator to let him know when to expect the samples.

### Collection Location for Different Sampling Goals:

Whenever a toxin sample is being collected, a phytoplankton sample should also be collected and preserved.

- 1) If a toxin sample is being collected as part of DSW's regular inland lakes monitoring program, the sample may be collected at L1. However, if an algae bloom is observed elsewhere, then samples should be collected within the bloom and the GPS location of the collection point recorded.
- 2) If a toxin sample is being collected for screening of recreational lakes when an algae bloom is noted, samples will be taken at all major use/contact areas on lakes (i.e. swimming beach, boat ramp, fishing dock, middle of the lake if lake is used for waterskiing and jet skiing, etc.) where an algal bloom is observed. Coordinate with the HAB Coordinator to determine where samples should be collected if there is a question.
- 3) If a toxin sample is being collected to determine toxin level at an intake, the sample will be collected at the depth of the intake and a finished water sample will be collected from the plant after coordinating with the plant operator. If there is a surface scum near the intake, an additional sample should be collected from the surface.

Samples will be collected in accordance with the HAB coordinator's yearly strategy. Additional samples may be collected during other times outside the yearly strategy when warranted. For example, the HAB coordinator may direct samples to be collected in a public water supply lake in the winter when there are reports of taste and odor or HAB bloom reports.

### Collection Procedure and Location:

Beach samples will be taken from one point at mid-beach area in water that is three feet total depth; the sample will be taken at one foot depth in the water column. At least 500 ml should be collected from each sampling point;

If there are multiple beaches on a single lake, all beaches will need to be sampled in the same manner as stated above, differentiating each by an alternate name/location;

Samples from other major use areas (boat ramp, fishing dock, etc.) should be taken from water that is three feet in total depth, the sample will be taken at one foot depth in the water column;

If an algal “scum” is found at any of the above areas a surface sample should be taken which includes the “scum” and clearly noted on the container label;

If an algal “scum” or major bloom is found in another area of the lake the sampler should take a sample. The sample will be taken at one foot depth (same procedure as above), unless it is a “scum”, in which case a surface sample which includes the “scum” should be taken;

GPS all sites where samples are obtained;

Samples are immediately placed on wet ice in a cooler until transported back to the office where they should be stored in a freezer and frozen until shipment to the lab.

Note: Whenever possible, collect basic water quality information at each collection site, at the depth of collection. This should include pH, Dissolved Oxygen, Temperature, and Chlorophyll *a*.

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After arriving at lake:

Label sample container(s) with appropriate label(s).

Drive the boat to the beach area (after gaining permission from the beach/lake manager.) If arriving prior to open beach hours with few/no swimmers present, slowly maneuver boat (preferably with no motor, as not to stir up bottom substrate) to mid-beach at three feet total water depth. Invert a 1 quart cubitainer (or other approved container) and lower it into the water column one foot deep, turn the container upright allowing it to fill, remove it from the water, and pour off enough water to have 500 ml collected. Install a cap and immediately place the sample on wet ice in the cooler. Note that sunlight degrades algal toxins, so it is important to immediately place the collected sample in the dark in the cooler.

If arriving later when there are many swimmers, or if you have not gained permission from the manager to drive the boat in the beach area, then wade slowly (as not to stir bottom substrate) to a total water depth of three feet. Allow any sediment that is stirred up to settle, and sample in the same manner as described above. Sample at a one foot depth and place on wet ice in cooler ASAP. Note that waders should be worn to minimize skin contact with algal toxins and to prevent contact with scums. Waders should be rinsed off well when exiting the water. Collect samples at other major use areas (boat ramp, fishing dock, etc.) in the same manner as described above. If an algal “scum” is found in any of the above major use areas, a surface sample should be taken which includes the “scum”.

If an algal scum or major bloom is found in another area of the lake (not at one of the above “major use” areas) the sampler should use best professional judgment and take a sample if it is warranted. The sample should be taken at a one foot depth (same procedure as above), unless it is a “scum”, in which case a surface sample which includes the “scum” should be taken. Again, pour off enough water to have 500 ml collected. Install cap and immediately place on wet ice in a cooler. The sample should be shipped on ice or transported to the office and placed in a freezer and frozen until it is shipped to the laboratory.

Use a 4 oz – 6 oz glass container for collecting finished drinking water leaving some space at the top since the sample may be frozen either in your laboratory or at the Celina laboratory. Make sure that you collect 500 ml of raw water at the intake at the same time you collect finished water.

If you suspect the presence of benthic algae, collect a sample near the bottom.

Samples should be immediately put in a cooler in the dark and on wet ice.

#### Labeling and Follow-Up:

The following information should be put on a label for each sample. This information with the additional information should be e-mailed to the Inland Lakes Coordinator for tracking, and for use as the receiving report.

#### **Label Information:**

District

Lake Name

Associated L-1 number

Collection Date/Time (military)

Sample Location (GPS latitude/longitude coordinates, preferably WGS-84 in degrees/minutes/ seconds.)

Sample Depth (meters)

**Additional Information:**

Weather Conditions

Shipping Date

Frozen? If so, date?

Shipping Instructions:

The samples must be kept in the dark on ice or on ice packs prior to and during shipping. Include a standard chain of custody form (see Surveillance Manual). Enclose each sample container in a separate sealed plastic bag. Enclose ice in a sealed plastic bag and place on sealed containers in the shipping container. Prepare the package for shipment to the Celina PWS.

If possible, collect the samples early in the week and ship to Celina PWS for delivery by Wednesday morning. The Celina PWS will only process samples on Wednesday or Thursday each week.

If you are not able to ship for delivery to the Celina PWS by Wednesday morning, then ship the samples the same day you collect them for delivery to the Celina PWS the next day with the chain of custody form and instructions that the sample must be placed in the freezer until processing. Or, you may freeze the samples in your laboratory until you can ship them to the Celina PWS for analysis.

If you collect samples and can't guarantee delivery before the weekend to Celina, freeze the samples until you are ready to ship them.

Freezing Instructions:

If samples will be processed within 48 hours, they will be kept in the dark and on ice. If a sample will not arrive for processing at the laboratory within 48 hours, the sample will be frozen in a standard freezer until it is processed. However, if the laboratory will use freeze/thaw extraction to release endotoxins, then freezing as soon as possible is recommended (even prior to shipment to the lab if possible, though the analyzing laboratory may have a preference on this). Samples should be analyzed as soon as possible after they are thawed.

Processing Instructions:

Total toxin (free toxins and endotoxins) shall be determined for recreational sample analysis. Samples shall be processed to ensure all algal cells are lysed which should be verified through microscopic analysis. Utilizing an ultrasonicator is a good way to lyse algal cells, however care must be employed to prevent any volatilization 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.

Processing finished water samples generally will not require sonication as it is not expected that algal cells will be in the finished water. Free toxin concentrations in finished water should be determined.

## ATTACHMENT 7 (A)

### Data Quality Objectives - Sediment

**Table 1. PAH Final Chronic Values and Maximums**

<b>PAH</b>	<b>Final Chronic Value (µg/g<sub>oc</sub>)</b>	<b>Maximum (µg/g<sub>oc</sub>)</b>
Indan	349	127200
<b>Naphthalene</b>	385	61700
<b>C1-naphthalenes</b>	444	--
1-methylnaphthalene	446	165700
2-methylnaphthalene	447	154800
<b>Acenaphthylene</b>	452	24000
<b>Acenaphthene</b>	491	33400
1-ethylnaphthalene	507	142500
2-ethylnaphthalene	509	129900
<b>C2-naphthalenes</b>	510	--
1,4-dimethylnaphthalene	510	192300
1,3-dimethylnaphthalene	513	157100
2,6-dimethylnaphthalene	513	33800
2,3-dimethylnaphthalene	513	49900
1,5-dimethylnaphthalene	514	62400
<b>Fluorene</b>	538	26000
<b>C3-naphthalenes</b>	581	--
2,3,5-trimethylnaphthalene	584	--
1,4,5-trimethylnaphthalene	584	129300
<b>Anthracene</b>	594	1300
<b>Phenanthrene</b>	596	34300
<b>C1-fluorenes</b>	611	--
1-methylfluorene	612	49700
<b>C4-naphthalenes</b>	657	--
2-methylantracene	667	2420
1-methylantracene	667	--
9-methylantracene	668	21775
2-methylphenanthrene	669	--
1-methylphenanthrene	670	24100
<b>C1-phenanthrene/anthracenes</b>	670	--
9-ethylfluorene	673	--
<b>C2-fluorenes</b>	686	--
<b>Pyrene</b>	697	9090
<b>Fluoranthene</b>	707	23870
2-ethylantracene	739	--
<b>C2-phenanthrene/anthracenes</b>	746	--
9,10-dimethylantracene	748	14071
3,6-dimethylphenanthrene	749	--

<b>PAH</b>	<b>Final Chronic Value (µg/g<sub>oc</sub>)</b>	<b>Maximum (µg/g<sub>oc</sub>)</b>
<b>C3-fluorenes</b>	769	--
<b>C1-pyrene/fluoranthenes</b>	770	--
2,3-benzofluorene	787	558
Benzo(a)fluorene	787	12500
<b>C3-phenanthrene/anthracenes</b>	829	--
Naphthacene	838	207
<b>Benz(a)anthracene</b>	841	4153
<b>Chrysene</b>	844	826
Triphenylene	846	19400
<b>C4-phenanthrene/anthracenes</b>	913	--
<b>C1-benzanthracene/anthracenes</b>	929	--
C3-pyrene/fluoranthenes	949	--
<b>Benzo(a)pyrene</b>	965	3840
<b>Perylene</b>	967	431
<b>Benzo(e)pyrene</b>	967	4300
<b>Benzo(b)fluoranthene</b>	979	2169
Benzo(j)fluoranthene	981	3820
<b>Benzo(k)fluoranthene</b>	981	1220
<b>C2-benzanthracene/chrysenes</b>	1008	--
9,10-dimethylbenz(a)anthracene	1021	124200
7,12-dimethylbenz(a)anthracene	1021	145300
7-methylbenzo(a)pyrene	1058	--
<b>Benzo(ghi)perylene</b>	1095	648
<b>C3-benzanthracene/chrysenes</b>	1112	--
<b>Indeno(1,2,3-cd)pyrene</b>	1115	--
<b>Dibenz(a,h)anthracene</b>	1123	2389
Dibenz(a,j)anthracene	1123	47680
Dibenz(a,c)anthracene	1129	7400
<b>C4-benzanthracene/chrysenes</b>	1214	--
C1-dibenz(a,h)anthracenes	1221	--
Coronene	1230	821
C2-dibenz(a,h)anthracenes	1325	--
C3-dibenz(a,h)anthracenes	1435	--

From: U.S. EPA's Procedures for the Derivation of Equilibrium Partitioning Sediment Benchmarks (ESBs) for the Protection of Benthic Organisms: PAH Mixtures, Office of Research and Development, November 2003, EPA/600/R-02/013.  
<http://www.epa.gov/nheerl/publications/files/PAHESB.pdf>

**Table 2. PAH Uncertainty Factors**

<b>Percentile</b>	<b>13 PAH Uncertainty factor</b>	<b>23 PAH Uncertainty factor</b>
50	2.75	1.64
80	6.78	2.8
90	8.45	3.37
95	11.5	4.14
99	16.9	6.57

From: U.S. EPA's [Procedures for the Derivation of Equilibrium Partitioning Sediment Benchmarks \(ESBs\) for the Protection of Benthic Organisms: PAH Mixtures](http://www.epa.gov/nheerl/publications/files/PAHESB.pdf), Office of Research and Development, November 2003, EPA/600/R-02/013.  
<http://www.epa.gov/nheerl/publications/files/PAHESB.pdf>

## ATTACHMENT 7 (B)

### Data Quality Objectives – Fish Tissue

Ohio EPA Division of Environmental Services  
 Fish Tissue Reporting Limits (RLs) \*

DES 08/08/2003

Chemical	RL	Chemical	RL
Aldrin	10	SAS 305**	
Total Arsenic	40	o-isopropyl-1,1-diphenylethane	40
Total Cadmium	4	m-isopropyl -1,1-diphenylethane	40
Alpha-Chlordane	10	p-isopropyl- 1,1-diphenylethane	40
Gamma-Chlordane	10	p-isopropyl-1,2-diphenylethane	40
Oxychlordane	10		
cis-Nonachlor	10	SAS310**	
trans-Nonachlor	10	o-sec Butyl diphenylmethane	40
4,4'-DDD	10	m-sec Butyl diphenylmethane	40
4,4'-DDE	10	p-sec Butyl diphenylmethane	40
4,4'-DDT	10	o-sec Butyl 1,1-diphenylethane	40
Dieldrin	10	m-sec Butyl 1,1-diphenylethane	40
Endosulfan	10	p-sec Butyl 1,1-diphenylethane	40
Endrin	10	o-sec Butyl 1,2-diphenylethane	40
Heptachlor	10	m-sec Butyl 1,2-diphenylethane	40
Heptachlor Epoxide	10	p-sec Butyl 1,2-diphenylethane	40
Hexachlorobenzene	10		
Total Lead	40		
Methoxychlor	10		
Mirex	10		
Total mercury	24		
PCB-1016	50		
PCB-1221	50		
PCB-1232	50		
PCB-1242	50		
PCB-1248	50		
PCB-1254	50		
PCB-1260	50		
Total Selenium	40		
Toxaphene	20		

\* Fish tissue RLs and Total Metals are reported in ug/kg wet weight. Fish tissue analytical results include percent lipid for each sample.

\*\* Special request. Other chemicals may also be requested as needed.

Ohio Fish Consumption Advisory Chemicals: (ODH 10/25/99)  
 Fillet Chemical Upper Bound Limit Concentrations (ppm) and Advisory Meal  
 Consumption Rate Using the Great Lakes' Governors Procedure \*

Chemical (RfD µg/kg/day)	Unrestricted	1/week	1/month	6/year	Do Not Eat
Aldrin (0.03)	<0.030	0.131	0.568	1.135	>1.135
Total Arsenic (0.3)	<0.150	0.656	2.838	5.676	>5.676
Total Cadmium (1.0)	<0.500	2.188	9.459	18.91	>18.919
Total Chlordane (0.5)	<0.500	2.188	9.459	18.919	>18.919
Total DDT (0.5)	<0.500	2.188	9.459	18.919	>18.919
Dieldrin (0.05)	<0.050	0.220	1.000	1.999	>1.999
Endosulfan (6.0)	<6.000	26.250	131.514	227.027	>227.027
Endrin (0.30)	<0.300	1.313	5.676	11.351	>11.351
Heptachlor (0.5)	<0.500	2.188	9.459	18.919	>18.919
Heptachlor Epoxide (0.013)	<0.013	0.057	0.246	0.492	>0.492
Hexachlorobenzene (0.8) **	<0.800	3.500	15.135	30.270	>30.270
Total Lead (6.0)	<0.086	0.375	1.622	3.243	>3.243
Lindane (6.0)	<0.3	1.313	5.676	11.315	>11.315
Methoxychlor (5.0)	<5.000	21.875	94.545	189.189	>189.189
Mirex (0.2)	<0.200	0.875	3.784	7.568	>7.568
Methylmercury (0.1)	Unrestricted	2/week	1/week	1/month	Do Not Eat
	<0.050	0.110	0.220	0.999	>1.000
Total PCBs (0.05) HPV **	<0.050	0.220	1.000	1.999	>1.999
Total SAS 305 (50.0) **	<50,000	218,750	945,946	1,891,892	>1,891,892
Total SAS 310 (28.6) **	<28,600	125,125	541,081	1,082,162	>1,082,162
Total Selenium (5.0)	<2.500	10.938	47.927	94.545	>94.545
Toxaphene (0.25)	<0.250	1.094	4.730	9.459	>9.45

\* Concentrations are reported in mg/kg (ppm) raw fish fillet wet weight. Meal consumption rates are: No restrictions (225 meals/year); One meal/week (52 meals/year); One meal/month (12 meals/year); 6 meals/year; and Do not eat. All metals results are reported as Total metals, including Mercury. Total PCBs are reported as the sum of Aroclors 1016, 1221, 1232, 1242, 1248, 1254 and 1260; Total Chlordane is reported as the sum of Alpha-Chlordane, Gamma-Chlordane, Oxychlordane, cis-Nonachlor and trans-Nonachlor; Total DDT is reported as the sum of DDT and Metabolites (DDE and DDD).

\*\* HPV = Health Protection Value; HCB = hexachlorobenzene; Total SAS 305 is a chemical mixture of the following alkylated biphenyls: o-isopropyl-1,1-diphenylethane, m-isopropyl-1,1-diphenylethane, p-isopropyl-1,1-diphenylethane and p-isopropyl-1,2-diphenylethane; Total SAS 310 is a chemical mixture of the following alkylated biphenyls: o-sec Butyl diphenylmethane, m-sec Butyl diphenylmethane, p-sec Butyl diphenylmethane, o-sec Butyl 1,1-diphenyl-ethane, m-sec Butyl 1,1-diphenylethane, p-sec Butyl 1,1-diphenylethane, o-sec Butyl 1,2-diphenylethane, m-sec Butyl 1,2-diphenylethane, and p-sec Butyl 1,2-diphenylethane.

## ATTACHMENT 7 (C)

### Data Quality Objectives – Water Column

#### 1) Water Quality Standards

Ohio Administrative Code 3745-1-07

#### 2) MDLs and RLs

[http://epaintra.epa.state.oh.us/des/html/limits\\_ rls\\_ mdl\\_ s\\_ .html](http://epaintra.epa.state.oh.us/des/html/limits_ rls_ mdl_ s_ .html)

**Note: The correct Metal RLs are as follows:**

**OhioEPA** Division of Environmental Services  
**Reporting Limits**

DRINKING WATER						
PARAMETER	REPORTING	UNITS	CAS	REFERENCE	ANALYTICAL METHOD	
	LIMITS		NUMBER		ELIMS	DESCRIPTION
Aluminum	200µg/L	P1105	USEPA200.7	ICP DW	ICP	
Antimony	2µg/L	P1097	USEPA200.8	ICPMS DW	ICPMS	
Arsenic	2µg/L	P1002	USEPA200.8	ICPMS DW	ICPMS	
Barium	15µg/L	P1007	USEPA200.7	ICP DW	ICP	
Beryllium	0.2µg/L	P1012	USEPA200.8	ICPMS DW	ICPMS	
Cadmium	0.2µg/L	P1027	USEPA200.8	ICPMS DW	ICPMS	
Calcium	2mg/L	P916	USEPA200.7	ICP DW	ICP	
Chromium	2µg/L	P1034	USEPA200.8	ICPMS DW	ICPMS	
Cobalt	2µg/L	P1037	USEPA200.8	ICPMS DW	ICPMS	
Copper	2µg/L	P1042	USEPA200.8	ICPMS DW	ICPMS	
Hardness, Total	10mg/L	P900	USEPA200.7	ICP DW	ICP	
Iron	50µg/L	P1045	USEPA200.7	ICP DW	ICP	
Lead	2µg/L	P1051	USEPA200.8	ICPMS DW	ICPMS	
Magnesium	1mg/L	P927	USEPA200.7	ICP DW	ICP	
Manganese	10µg/L	P1055	USEPA200.7	ICP DW	ICP	
Mercury	0.2µg/L	P71900	USEPA245.1	Mercury DW	COLD VAPOR	
Nickel	2µg/L	P1067	USEPA200.8	ICPMS DW	ICPMS	
Potassium	2mg/L	P937	USEPA200.7	ICP DW	ICP	
Selenium	2µg/L	P1147	USEPA200.8	ICPMS DW	ICPMS	
Silver	0.2µg/L	P1077	USEPA200.8	ICPMS DW	ICPMS	
Sodium	5mg/L	P929	USEPA200.7	ICP DW	ICP	
Strontium	30µg/L	P1082	USEPA200.7	ICP DW	ICP	
Thallium	1.5µg/L	P1059	USEPA200.8	ICPMS DW	ICPMS	
Tin	2µg/L	P1102	USEPA200.8	ICPMS DW	ICPMS	
Zinc	10µg/L	P1092	USEPA200.7	ICP DW	ICP	

AQUEOUS, SURFACE WATER, WASTEWATER						
PARAMETER	REPORTING	UNITS	CAS	REFERENCE	ANALYTICAL METHOD	
	LIMITS		NUMBER		ELIMS	DESCRIPTION
Aluminum	200µg/L	P1105	USEPA200.7	ICP (WAT)	ICP	
Antimony	2µg/L	P1097	USEPA200.8	ICPMS (WAT)	ICPMS	
Arsenic	2µg/L	P1002	USEPA200.8	ICPMS (WAT)	ICPMS	
Barium	15µg/L	P1007	USEPA200.7	ICP (WAT)	ICP	
Beryllium	0.2µg/L	P1012	USEPA200.8	ICPMS (WAT)	ICPMS	
Cadmium	0.2µg/L	P1027	USEPA200.8	ICPMS (WAT)	ICPMS	
Calcium	2mg/L	P916	USEPA200.7	ICP (WAT)	ICP	
Chromium	2µg/L	P1034	USEPA200.8	ICPMS (WAT)	ICPMS	
Cobalt	2µg/L	P1037	USEPA200.8	ICPMS (WAT)	ICPMS	
Copper	2µg/L	P1042	USEPA200.8	ICPMS (WAT)	ICPMS	
Hardness, Total	10mg/L	P900	USEPA200.7	ICP (WAT)	ICP	
Hexavalent Chromium	10µg/L	P1220	SM3500-GRD	CR+6	SPECTROPHOTOMETER	
Iron	50µg/L	P1045	USEPA200.7	ICP (WAT)	ICP	
Lead	2µg/L	P1051	USEPA200.8	ICPMS (WAT)	ICPMS	
Magnesium	1mg/L	P927	USEPA200.7	ICP (WAT)	ICP	
Manganese	10µg/L	P1055	USEPA200.7	ICP (WAT)	ICP	
Mercury	0.2µg/L	P71900	USEPA245.1	Mercury (WAT)	COLD VAPOR	
Nickel	2µg/L	P1067	USEPA200.8	ICPMS (WAT)	ICPMS	
Potassium	2mg/L	P937	USEPA200.7	ICP (WAT)	ICP	
Selenium	2µg/L	P1147	USEPA200.8	ICPMS (WAT)	ICPMS	
Silver	0.2µg/L	P1077	USEPA200.8	ICPMS (WAT)	ICPMS	
Sodium	5mg/L	P929	USEPA200.7	ICP (WAT)	ICP	
Strontium	30µg/L	P1082	USEPA200.7	ICP (WAT)	ICP	
Thallium	1.5µg/L	P1059	USEPA200.8	ICPMS (WAT)	ICPMS	
Tin	2µg/L	P1102	USEPA200.8	ICPMS (WAT)	ICPMS	

## ATTACHMENT 7 (D)

### Data Quality Objectives— Phytoplankton, Microcystin and Zooplankton

#### Phytoplankton:

Collect sample with an integrated tube sampler; dispense in a churn splitter or clean container and thoroughly mix. Collect a 4 oz sub-sample and preserve with Logols Iodine.

#### Microcystin:

The WHO preliminary guideline criteria for microcystin are the criteria Ohio EPA uses to determine if Water Quality Advisories should be posted. The recreational guideline is 20 ppb, and the drinking water guideline is 1 ppb.

#### Zooplankton:

Collect sample with an 80 micron Wisconsin dip net. Identify to species and identify dominance by using a semi-quantitative approach for the purpose of identifying the phytoplankton assemblage which dominates in the lake. This information is used to evaluate the temporal dynamics of each type of plankton in the lake and to identify relative abundance of non-native species with implications for management to meet goals.