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Ohio Environmental Protection Agency

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 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, or 4) A Public Water System intake is located more than 500 yards from L1 and there are tributaries entering the lake between L1 and the intake location. The first three additional locations should be coordinated with the modeling staff as the study plans are developed to ensure adequate coverage in the event a lake model is required. To determine if separate intake sampling is necessary (only for herbicides and nitrates), contact DDAGW.

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 lake model, refer to Attachment 2 for methodology and Attachment 4 for the lake model template 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 (µmhos/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 (°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. The disk needs to deploy vertically in the water to obtain an accurate measurement. If necessary, the boat should be anchored to avoid drift. If it's not possible or practical to anchor the boat, working from the downwind side and adding weight to the disk can be helpful. When the water is choppy, average three readings.

Subjectivity inherent in the measurement can be minimized by having the same individual take the readings at a lake through the entire sampling season.

Standard procedures such as always sitting or kneeling and leaning over the side of the boat can also help obtain consistent results.

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™. 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™ (0.7 µ).

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). Rinse the sides of the filter tower/funnel with DI water. 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 $MgCO_3$ (supernatant from a supersaturated container - prepared by dissolving 1 gram of MgCO3 in 100 ml distilled water) and gently swirl the filter apparatus to distribute the $MgCo_3$ before completely releasing the vacuum as the last bit of buffered water

is pulled through the filter. (Note: $MgCO_3$ preserves the chlorophyll and is especially important to be used when the sample is collected from an acidic lake. However $MgCO_3$ will be used for every chlorophyll sample collected regardless of pH conditions). 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^{o} C.

For quality control purposes, collect at least 10% duplicates. 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 filterings. 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

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 $MgCO_3$ shall be added**.** Prepare $MgCO_3$ solution by adding enough $MgCO_3$ 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. (For data quality objectives, see Attachment 9(C))

Phytoplankton: Collect a sample on the first and fifth sampling events each year. If there is a bloom observed during one of the other sampling events, collect an additional sample of the bloom for identification. All samples should be submitted immediately after collection directly to the Inland Lakes program coordinator in Central Office for batching with all the district samples for submittal to the laboratory. See Attachments 6 and 7 for the sample collection and two processing protocols.

Zooplankton: Collect a sample on the first and fifth sampling event each year.

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 ¼ 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_2 tablet has been added (do not add Alka Seltzer to the trap). Be careful not to allow the CO_2 solution to spill over and into the bucket. Alternatively, Alka-Seltzer or club soda may be used. The CO_2 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.

<u>For Phytoplankton Samples:</u>

1. Use an integrated tube sampler (Whole Water Integrated tube 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 phytoplankton and cyanotoxin sampling procedures that are part of the routine Inland Lakes Monitoring Program.

12. See Attachment 7 for HAB sampling procedures when HABs are observed in the vicinity of beaches, other contact recreation areas or intakes.

Water Samples (For data quality objectives, see Attachment 9(B))

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

Routine monthly water samples are taken from 0.5 m below the surface and 0.5 m above the bottom and tested for parameters listed in Table 1 of this manual. This applies whether the lake is stratified or un-stratified. Samples collected for chlorophyll a and herbicide analysis are only taken from 0.5 m below the surface. *E. coli* is sampled at a depth of 1 foot below the surface.

Use either a submersible pump or a discreet sampler (i.e., Van Dorn Sampler or Kemmerer sampler). At each sampling interval, fill 1 gallon and 2 quart size Cubitainers™ (Low Density Polyethylene) with sample and add preservatives when

appropriate. The sample submitted for orthophosphate is placed in a 1 quart size cubitainer during the filtration process.

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

The herbicide analysis (method 525.2) should be run on active drinking water lakes (lakes with active withdrawals). This method requires a total of two (2) liter amber jars, both of which are preserved with **sodium sulfite (Na_2SO_3)** and 6N HCL (add sodium sulfite first, request preservatives from Ohio EPA laboratory, HCL in vial should be clear

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 the Division of Environmental Services. 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 orthophosphates, chlorophyll *a*, and any other parameter not on the inland lakes template.

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 reasoning for collection of the samples, the parameters for analysis, the depth(s) of sample collection, the number of samples necessary to meet the data quality objectives, and quality assurance/quality control practices for sample collection.

When sampling for semi-volatile organics and pesticides, 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. Carbamate analysis requires 4 mg of **sodium thio-sulfate ($Na_2S_2O_3$)** in two (2) 40 ml vials; Fill vials approximately ½ to 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 $Na_2S_2O_3$ into (2) 40 ml vials, and fill vial with sample. Shake vial vigorously to mix preservative.

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, Herbicides, Semi-Volatiles, DDT etc.

Collect Ortho-P samples in both surface and bottom samples during each sampling run and for lake model collections. Herbicides are collected from drinking water reservoirs only. Herbicide 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.

Cyanotoxin Collection

A cyanotoxin sample should be collected at the same time and location where a phytoplankton sample is collected. See Attachments 6 and 7 for the sample collection and two distinct sampling protocols.

Sediment Samples. (For data quality objectives, see Attachment 9(A))

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.

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_2SO_4	28 days
Water	1-qt. Cubitainer	Metals (No Hg)	ICP-MS1, ICP-1	HNO_3	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_2SO_3	28 days
Water	Glass Fiber Filter	Chlorophyll *a*	U.SA. EPA Method 445	$MgCo_3$ (freeze)	
Water	1-Speciman jar	*E.coli*		Non	6 hours
Water	1- 4 oz Glass Jar	Phytoplankton		0.7 ml (10 drops from eye dropper) Lugol's	Send to coordinator for processing
Water	1- 4 oz Glass Jar	Zooplankton		95% alcohol resulting in 70% alcohol dilution	Send to coordinator for 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)*

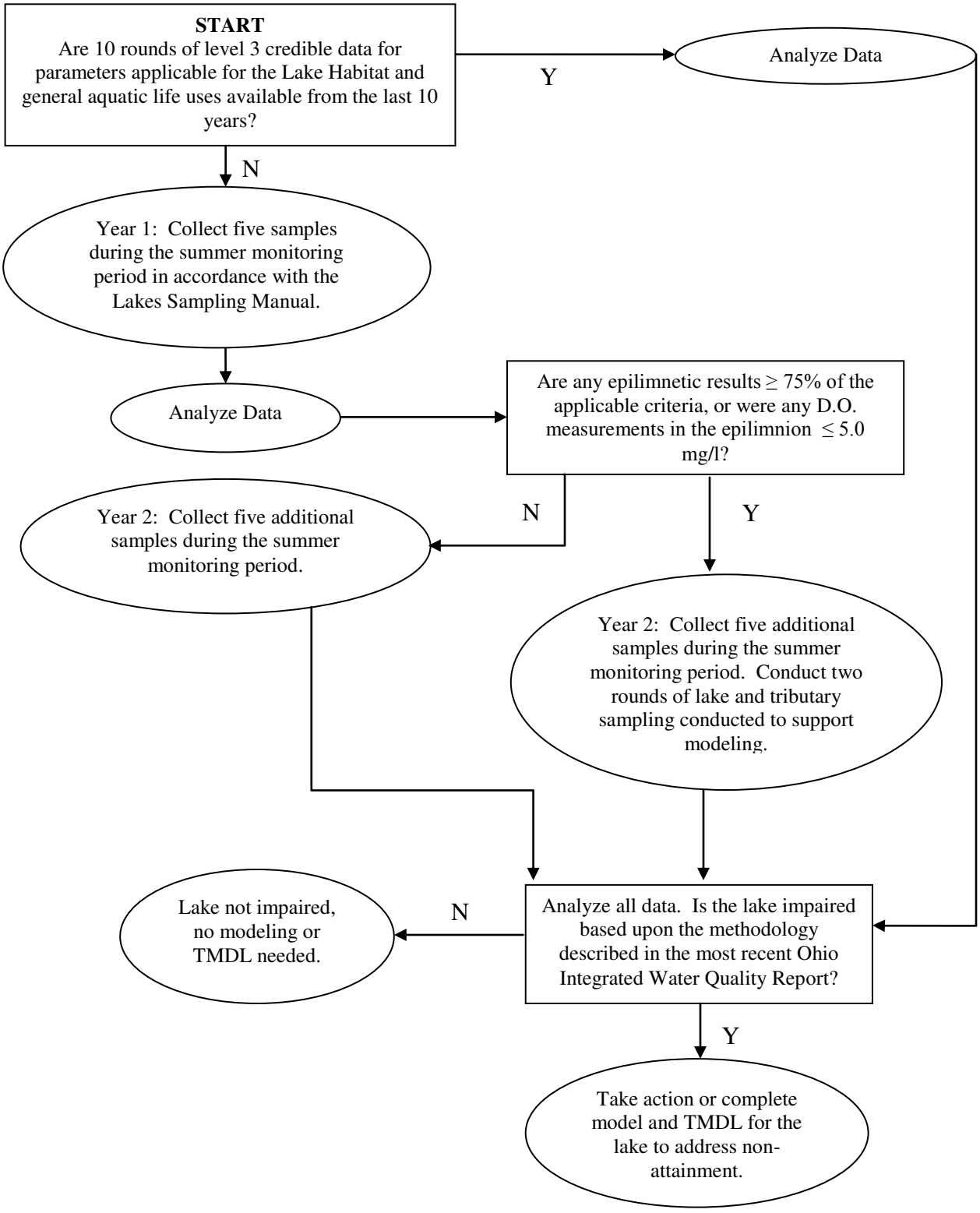
*** See Attachment 6 for Collection Procedures
All prior approval parameters need to be added to the Template when ordering.

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

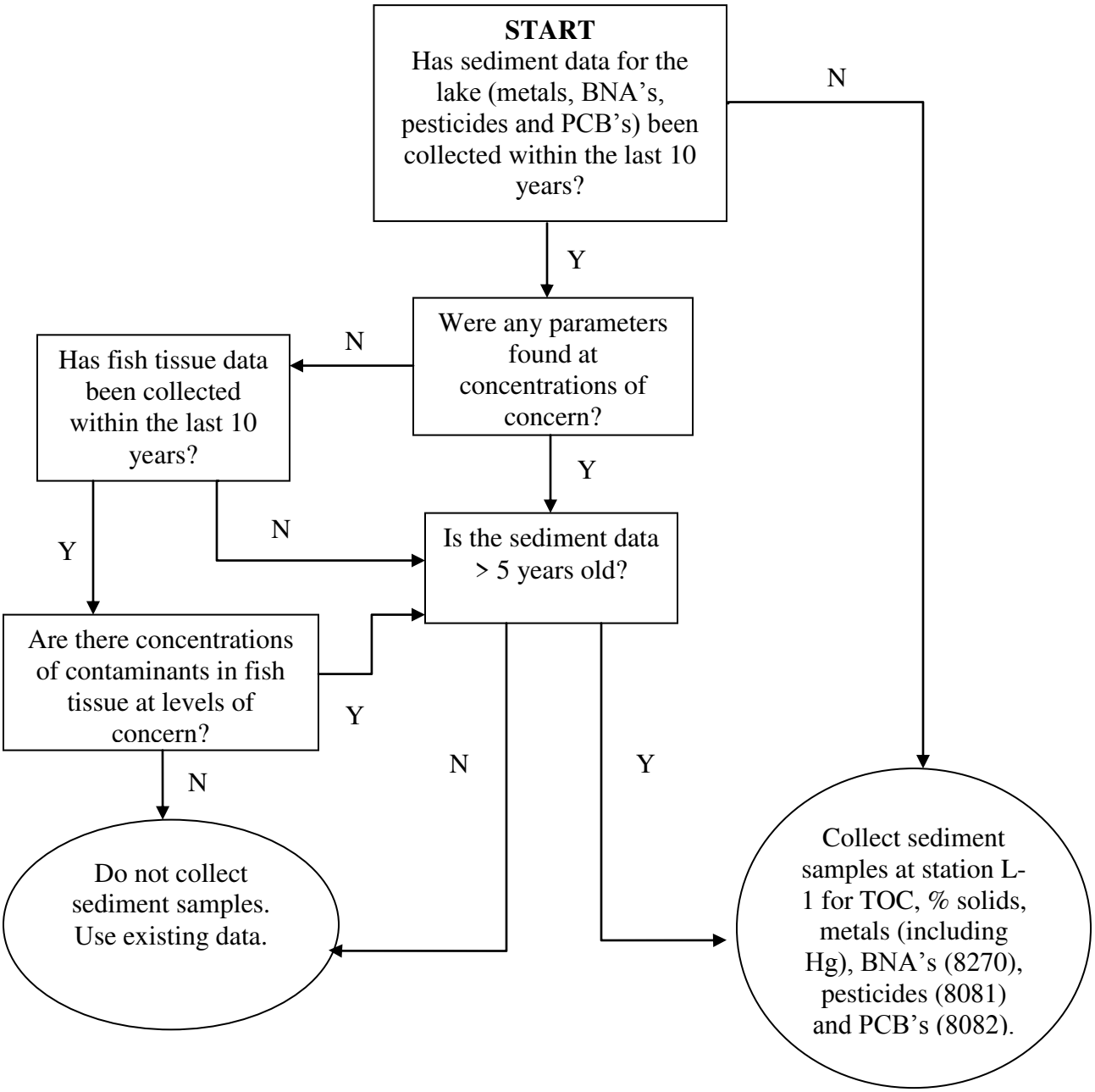
ATTACHMENT 1

Decision Matrices Sampling Flow Charts

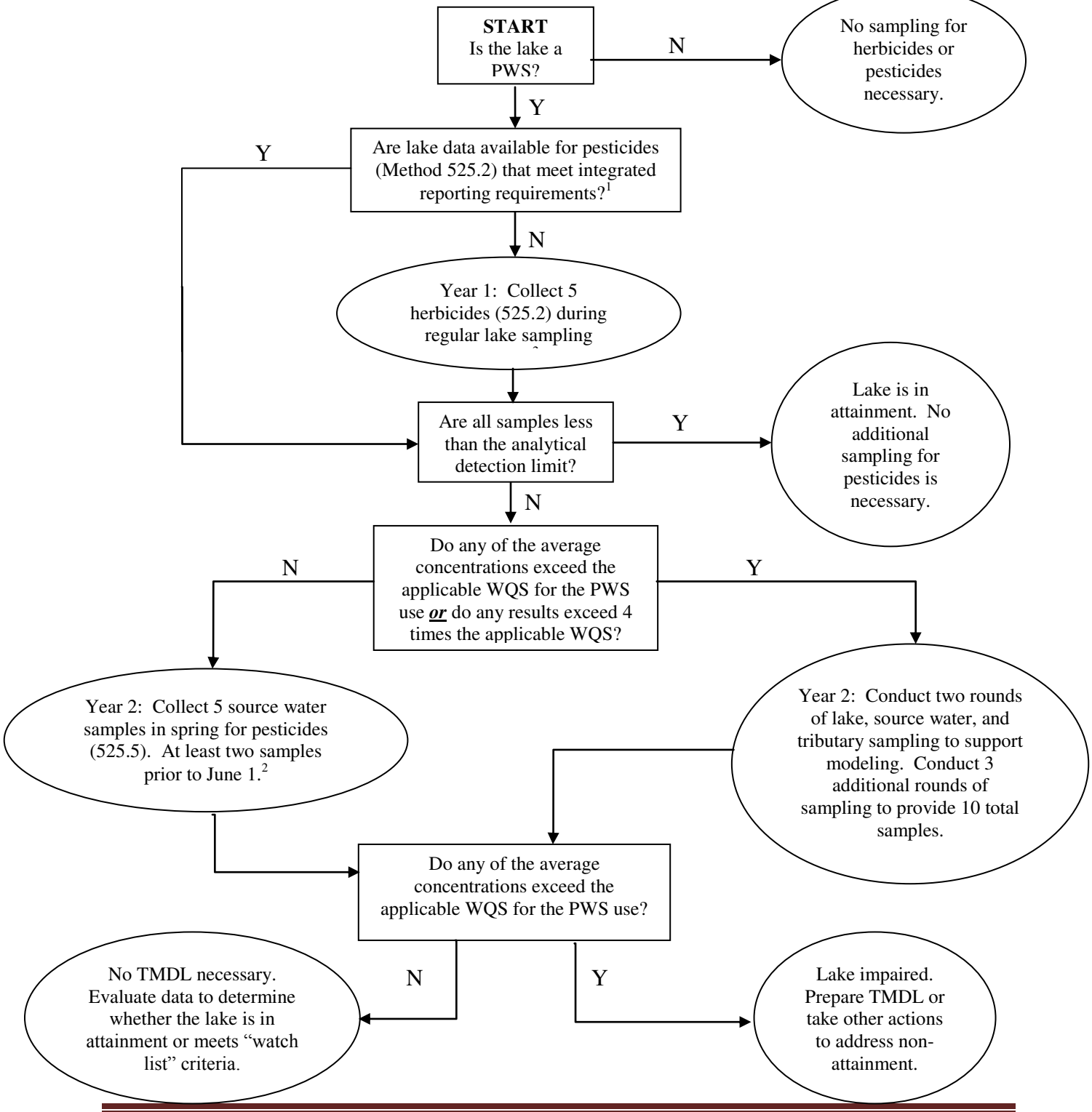
Inland Lake Sampling Strategy Flow Chart



Decision Flow Chart for Inland Lakes Sediment Sampling



Decision Flow Chart for Inland Lakes Herbicide Sampling (Method 525.2)



[1] A total of 10 analytical results meeting credible data requirements.
[2] 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.

TWO PHYTOPLANKTON/CYANOTOXIN SAMPLING PROTOCOLS

FOR ROUTINE INLAND LAKES MONITORING
(Attachment 6)

First and Fifth Sampling Events
(At any L-location with a bloom observed, OR L-1 location if no bloom observed at any other L-location)
AND
If Bloom Noted During Second, Third, or Fourth Sampling Event
(At any "L" location where a bloom is observed)

Collect **phytoplankton** sample with a 2m- integrated tube sampler.
Take a subsample of the composite plankton in a 4 oz glass jar.
Add 1ml/100 ml Lugol's solution to preserve.
Note: Notify coordinator prior to shipment if sending her samples from the Second, Third, or Fourth Sampling event.

(See Attachment 6)

Collect **cyanotoxin** sample in a 1-qt. Cubitainer.
Fill Cubitainer halfway (500 ml)
Record time of collection on container.
Freeze to preserve.
Hold in district freezer until notified by coordinator to either send it to a specified laboratory or discard.

(See Attachment 6)

Immediately after each **phytoplankton** collection, send the coordinator the preserved phytoplankton samples which will be batched with all district collections and sent to BSA Environmental or other specified laboratory for analysis.

Coordinator will notify the districts when and where **cyanotoxin** samples should be shipped for analysis or discarded. The district will specify on the submission forms that data from the cyanotoxin analysis will be immediately copied to the coordinator as well as the district.

The coordinator will forward the **phytoplankton** data to the districts to incorporate in their datasets when the data are released from the lab.

FOR RESPONSIVE BLOOM SAMPLING AT CONTACT RECREATION AREAS
(Attachment 7)

When a bloom is observed near an intake, a public beach or other contact recreation area at any time.

Collect **phytoplankton** sample with a 2m- integrated tube sampler if in open water. When collecting at a beach, collect along transects (see Attachment 7)
Add 1ml/100 ml Lugol's solution to preserve.

Note: Notify coordinator if collecting samples near an intake, a public beach, or other contact recreation area. When collecting near an intake, immediately notify the PWS HAB coordinator, district drinking water inspector and the PWS operator.

Collect **cyanotoxin** sample in a 1-qt. Cubitainer.
Fill Cubitainer halfway (500 ml)
Record time of collection on container,
Freeze to preserve if the sample can't be delivered to the lab within 36 hours.
If bloom is near an intake, collect a raw water intake and finished water cyanotoxin sample. DDAGW staff may be able to assist with sampling, if necessary.

Ship both samples overnight to DES for analysis.

ATTACHMENT 2

Lake Modeling Methodology Sampling Profile Graphic And Flow Tracker

Supplement - Lake Modeling Sampling Protocol

Initially, depth profile including temperature, pH, dissolved oxygen, and conductivity data must be collected at a maximum of 1 meter intervals. Determination of the existence of a thermocline is essential for proper sampling for modeling, however Ohio inland lakes tend not to have a sharp thermocline. If the above measurements determine that there is a sharp thermocline then use the sampling methods below for stratified lakes

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
    - Three samples – grabs at:
      - Surface (0.50 meter depth from surface)
      - Mid-depth
      - One meter from bottom
  - Stratified (thermocline exists)
    - Three samples – Composite samples taken from the epilimnion only
      - Epilimnion composite of three equivalent volume aliquots (Note: Use of a Churn Sample Splitter to composite samples is described in Attachment 3.)
        - 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 grab
        - Composite aliquots if needed for sufficient volume

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
  - Inland Lakes Tribs Template
  - Chlorophyll a - as needed

LAKE DISCHARGE
- Measure effluent stream flow same day as limnology work
- Grab sample same day as limnology work
  - Inland Lakes Tribs Template
  - Chlorophyll a - as needed

Water quality components

Laboratory (for each respective sample from lake and stream)
- Inland Lakes and Inland Lakes Tribs Templates
- See the parameter list in Attachment 4
- Chlorophyll a - as needed

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 rinse with DI water and sample water 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.

Inland Lakes Model

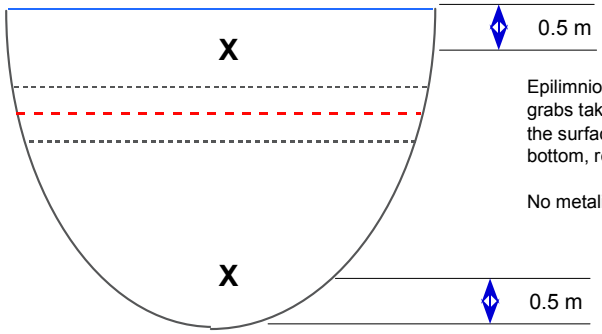
Standard Limnology Sampling

Parameters:

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

Secchi disk transparency.

Analysis: Inland_Lakes_Water template



Epilimnion and hypolimnion grabs taken from 0.5 m below the surface and 0.5 m above the bottom, respectively.

No metalimnion sample.

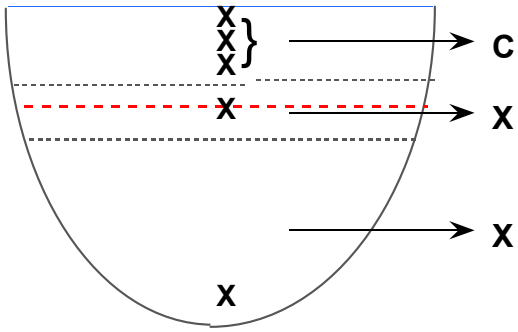
Stratified Lakes Modeling

Parameters:

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

Secchi disk transparency.

Analysis: Inland Lakes Water template



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 collected at the thermocline

Hypolimnion grab at one meter from bottom

Aliquots composited to produce a spatial composite sample.

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

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 *FlowTacker 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) H2SO4 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 taken back to your field office/lab area and cleaned following the Phosphorus Syringe Cleaning Protocol. The syringes can be cleaned and re-used up to three times before disposal (saving money and landfill space).

Wildlife Supply Company

Operating Instructions for 1920-1940 Horizontal Beta™ Bottles

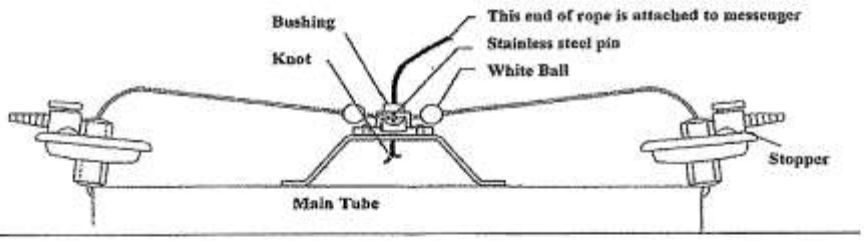
Safety:

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 c able 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 .
- **910-022** *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

INSTRUCTIONS

Scienceware®

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) at 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 swirling 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 at 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 breaking 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 recommended 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 nonrepresentative 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 opened to 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.

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_TRIBS

Modified On: 4/23/2012 10:44:25 Modified By: COESCH

Description: Samples submitted by DSW WQ staff for tributaries for modeling.

Group Name: INORGANIC

Analysis / Schedule	Description	Instrument	Rep	Std	A/S
Alkalinity	TOTAL ALKALINITY		1	✓	✓
Ammonia	AMMONIA		1	✓	✓
Carb_Bicarb	CARBONATE/BICARBONATE		1	✓	✓
CBOD-20	CBOD, 20-DAY		1	✓	✓
Chloride	CHLORIDE		1	✓	✓
Nitrate	NITRATE+NITRITE		1	✓	✓
Nitrite	NITRITE		1	✓	✓
Orthophosphate	ORTHOPHOSPHORUS		1	✓	✓
Solids_Diss	TOTAL DISOLVED SOLIDS		1	✓	✓
Solids_Susp	TOTAL SUSPENDED SOLIDS		1	✓	✓
Solids_Susp_Vol	TOTAL SUSPENDED VOLATILE SOLIDS		1	✓	✓
Sulfate	SULFATE		1	✓	✓
TKN	TOTAL KJELDAHL NITROGEN		1	✓	✓
TOC	TOTAL ORGANIC CARBON, WATER		1	✓	✓
TP	TOTAL PHOSPHORUS		1	✓	✓
Turbidity	TURBIDITY		1	✓	✓

OhioEPA Division of Environmental Services

Report for Test Schedule: INLAND_LAKES_WATER

Modified On: 5/1/2012 13:16:58 Modified By: COESCH

Description: DSW inland lakes water amples--inorganic analysis

Group Name: INORGANIC

Analysis / Schedule	Description	Instrument	Rep	Std	A/S
Alkalinity	TOTAL ALKALINITY		1	✓	✓
Ammonia	AMMONIA		1	✓	✓
Carb_Bicarb	CARBONATE/BICARBONATE		1	✓	✓
Chloride	CHLORIDE		1	✓	✓
ICP_1	ICP 1 (Al,Ba,Ca,Fe,Mg,Mn,Na,K,Sr,Zn,Hardness), PACKAGE, WATER		1	✓	✓
ICPMS_1	ICPMS 1 (As,Cd,Cr,Cu,Ni,Pb,Se), PACKAGE, WATER		1	✓	✓
Nitrate	NITRATE+NITRITE		1	✓	✓
Nitrite	NITRITE		1	✓	✓
Orthophosphate	ORTHOPHOSPHORUS		1	✓	✓
Solids_Diss	TOTAL DISOLVED SOLIDS		1	✓	✓
Solids_Susp	TOTAL SUSPENDED SOLIDS		1	✓	✓
Solids_Susp_Vol	TOTAL SUSPENDED VOLATILE SOLIDS		1	✓	✓
Sulfate	SULFATE		1	✓	✓
TKN	TOTAL KJELDAHL NITROGEN		1	✓	✓
TOC	TOTAL ORGANIC CARBON, WATER		1	✓	✓
TP	TOTAL PHOSPHORUS		1	✓	✓
Turbidity	TURBIDITY		1	✓	✓

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

OhioEPA *Division of Environmetal Services*

DES Use Only

Sample#_____

MM DD YY

Date Received: / /

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

Not for Official Use

Frequency Duration of Composite Sample:

	Container Information	
Qty	Type	Pres
	Air Filter	
	Cubitainer	NaOH
1	Cubitainer	HNO3
	Cubitainer	HNO3 Filt
1	Cubitainer	H2SO4
	Cubitainer	H2SO4 Filt
1	Cubitainer	NP
	Cubitainer	NP_Filt
	Jar	H2SO4_Phenol
	Jar	H2SO4_OG
	Sed	Frozen
	Sed	
	Bacteria	Sterile

Field QC

MSD D

Collected By: Anderson, Paul

Customer ID#: 08PWA0213

External ID#: 01040421

Referred By

Station ID#: OH0124-348

Sample Location: 17 - DEER CREEK RESERVOIR L-1

County: Stark

01040421

Template: Inland_Lakes_Water

Demand
- O — % Solids,Sed only
- O — BOD-20 day
- O — BOD-5 day
- O — BOD-Ultimate
- O — CBOD-20 day
- O — CBOD-5 day
- O — CBOD-Ultimate
- O — Conductivity
- O — Flashpoint
- O — OilGrease
- O — Particle Size, Sed only
- O — pH
- O — Solids _Diss(filt)
- O — Solids _Suspd(nonfilt)
- O — Solids _Total
- O — Solids_Total Volatile
- O — TOC

Nutrients
- O — Acidity,Total CaCO3
- O — AlkalinityTotal CaCO3
- O — Bicarbonate
- O — Chloride
- O — COD
- O — Chromium, Hexavalent (N/P_filt)
- O — Cyanide_Free (WAD)
- O — Cyanide _Total
- O — Fluoride
- O — LL Phosphorus, Total
- O — LL Phosphorus, Dissolved (Filt)
- O — Nitrite
- O — Ammonia/Nitrate+nitrite
- O — Phenolics, Total
- O — Phenolics, Total w/man dist.
- O — Phosphorus, Dissolved (Filt)
- O — Sulfate
- O — TKN / Phosphorous, Total

Microbiology
- O — E. coli
- O — Fecal Coliform
- O — Fecal Streptococcus
- O — MMO-MUG
- O — Total Coliform
- O — EC / EN / QTRAY

Misc.
- O — Turbidity
- O — _____
- O — _____
- O — _____
- O — _____

Metals
- O — **ICP 1**, *Water only* (Al,Ba,Ca,Cr,Cu,Fe,Mg,Mn,Na,Ni,K,Sr,Zn,Hardness)
- O — **ICP 2**, *Water only* (Ca,Mg,Hardness)
- O — **ICP 3**, *Sediment Only* (Al,Ba,Ca,Cr,Cu,Fe,Mg,Mn,Na,Ni,K,Sr,Zn,Pb)
- O — **ICP 4**, *SW846 only* (Al,Ba,Ca,Cr,Cu,Fe,Mg,Mn,Na,Ni,K,Sr,Zn,V,Co,Cu,TLBe Hardness)
- O — **ICP 5**, *SW846 SED only* (Al,Ba,Ca,Cr,Cu,Fe,Mg,Mn,Na,Ni,K,Pb,Sr,Zn,V,Co,TLBe)
- O — **ICP 6**, *Air Filters onl* (Cr,Ni,Pb,Zn,Mn)
- O — Vanadium
- O — Titanium

Single ICP Metals Or GFAA - Please list only if not using Metals packages above

O — _____ O — _____
O — _____ O — _____
O — _____ O — _____
O — _____ O — _____

Metals-Low Level
- O — **SIMA 1** , *Water only* (As,Cd,Pb,Se) LL
- O — **SIMA 2** , *Sed only* (As,Cd,Se) LL
- O — **SIMA 3** , *Air only* (As,COE) LL
- O — Arsenic, SW846 only, L L
- O — Cadmium, SW846 only, L L (Sed only)
- O — Lead, SW846 only, L L
- O — Selenium, SW846 only, L L

The following require **prior notification** to DES before submittal:
- O — Antimony, L L
- O — Beryllium, L L, *Water,Sed, & Air only*
- O — Cobalt, L L, *Water,Sed, & Air only*
- O — Copper L L, *Water only*
- O — Silver, LL
- O — Thallium, L L
- O — Tin, LL
- O — Mercury

Bioassay D

Field Comments: Surface

Lab Comments

Chlorine, mg/L P50060	Cond,umho/cm P94	DO,mg/L P299	Flow,cfs P61	Gage Ht,ft P65	pH, su P400	%Sat	Temp,oC P10	Corr.Cond,umho/cm P95

OhioEPA *Division of Environmetal Services*

DES Use Only

Sample#_____

MM DD YY

Date Received: / /

Inorganics Sample Submission Form

DW Certification #410

Client (Bill To): DSW

Special Project Identity: _____

(Project code/by 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

Not for Official Use

Frequency Duration of Composite Sample:

	Container Information	
Qty	Type	Pres
	Air Filter	
	Cubitainer	NaOH
1	Cubitainer	HNO3
	Cubitainer	HNO3 Filt
1	Cubitainer	H2SO4
	Cubitainer	H2SO4 Filt
1	Cubitainer	NP
	Cubitainer	NP_Filt
	Jar	H2SO4_Phenol
	Jar	H2SO4_OG
	Sed	Frozen
	Sed	
	Bacteria	Sterile

Field QC

MSD O

Collected By: Anderson, Paul

Customer ID#: 08PWA0213

External ID#: 01040422

Referred By

Station ID#: OH0124-348

Sample Location: County: Stark

18 - DEER CREEK RESERVOIR L-1

01040422

Template: **Inland_Lakes_Water**

Demand
- O — % Solids, Sed only
- O — BOD-20 day
- O — BOD-5 day
- O — BOD-Ultimate
- O — CBOD-20 day
- O — CBOD-5 day
- O — CBOD-Ultimate
- O — Conductivity
- O — Flashpoint
- O — Oil&Grease
- O — Particle Size, Sed only
- O — pH
- O — Solids_Diss(filt)
- O — Solids_Suspd(nonfilt)
- O — Solids_Total
- O — Solids_Total Volatile
- O — TOC

Microbiology
- O — E. coli
- O — Fecal Coliform
- O — Fecal Streptococcus
- O — MMO-MUG
- O — Total Coliform
- O — EC / EN / QTRAY

Nutrients
- O — Acidity,Total CaCO3
- O — Alkalinity,Total CaCO3
- O — Bicarbonate
- O — Chloride
- O — COD
- O — Chromium, Hexavalent (N/P_filt)
- O — Cyanide_Free (WAD)
- O — Cyanide_Total
- O — Fluoride
- O — LL Phosphorus, Total
- O — LL Phosphorus, Dissolved (Filt)
- O — Nitrite
- O — Ammonia/Nitrate+nitrite
- O — Phenolics, Total
- O — Phenolics, Total w/man dist.
- O — Phosphorus, Dissolved (Filt)
- O — Sulfate
- O — TKN / Phosphorous, Total

Misc.
- O — Turbidity
- O — _____
- O — _____
- O — _____
- O — _____

Metals
- O — **ICP 1**, Water only (Al,Ba,Ca,Cr,Cu,Fe,Mg,Mn,Na,Ni,K,Sr,Zn,Hardness)
- O — **ICP 2**, Water only (Ca,Mg,Hardness)
- O — **ICP 3**, Sediment Only (Al,Ba,Ca,Cr,Cu,Fe,Mg,Mn,Na,Ni,K,Sr,Zn,Pb)
- O — **ICP 4**, SW846 only (Al,Ba,Ca,Cr,Cu,Fe,Mg,Mn,Na,Ni,K,Sr,Zn,V,Cd,Co,Ti,Be,Hardness)
- O — **ICP 5**, SW846 SED only (Al,Ba,Ca,Cr,Cu,Fe,Mg,Mn,Ni,K,Na,Pb,Sr,Zn,V,Co,Ti,Be)
- O — **ICP 6**, Air Filters only (Cr,Ni,Pb,Zn,Mn)
- O — Vanadium
- O — Titanium

Single ICP Metals Or GFAA - Please list only if not using Metals packages above

- O — _____ O — _____
- O — _____ O — _____
- O — _____ O — _____
- O — _____ O — _____

Metals-Low Level
- O — **SIMA 1**, Water only (As,Cd,Pb,Se),LL
- O — **SIMA 2**, Sed only (As,Cd,Se),LL
- O — **SIMA 3**, Air only (As,CD,E),LL
- O — Arsenic, SW846 only, L L
- O — Cadmium, SW846 only, L L (Sed only)
- O — Lead, SW846 only, L L
- O — Selenium, SW846 only, L L

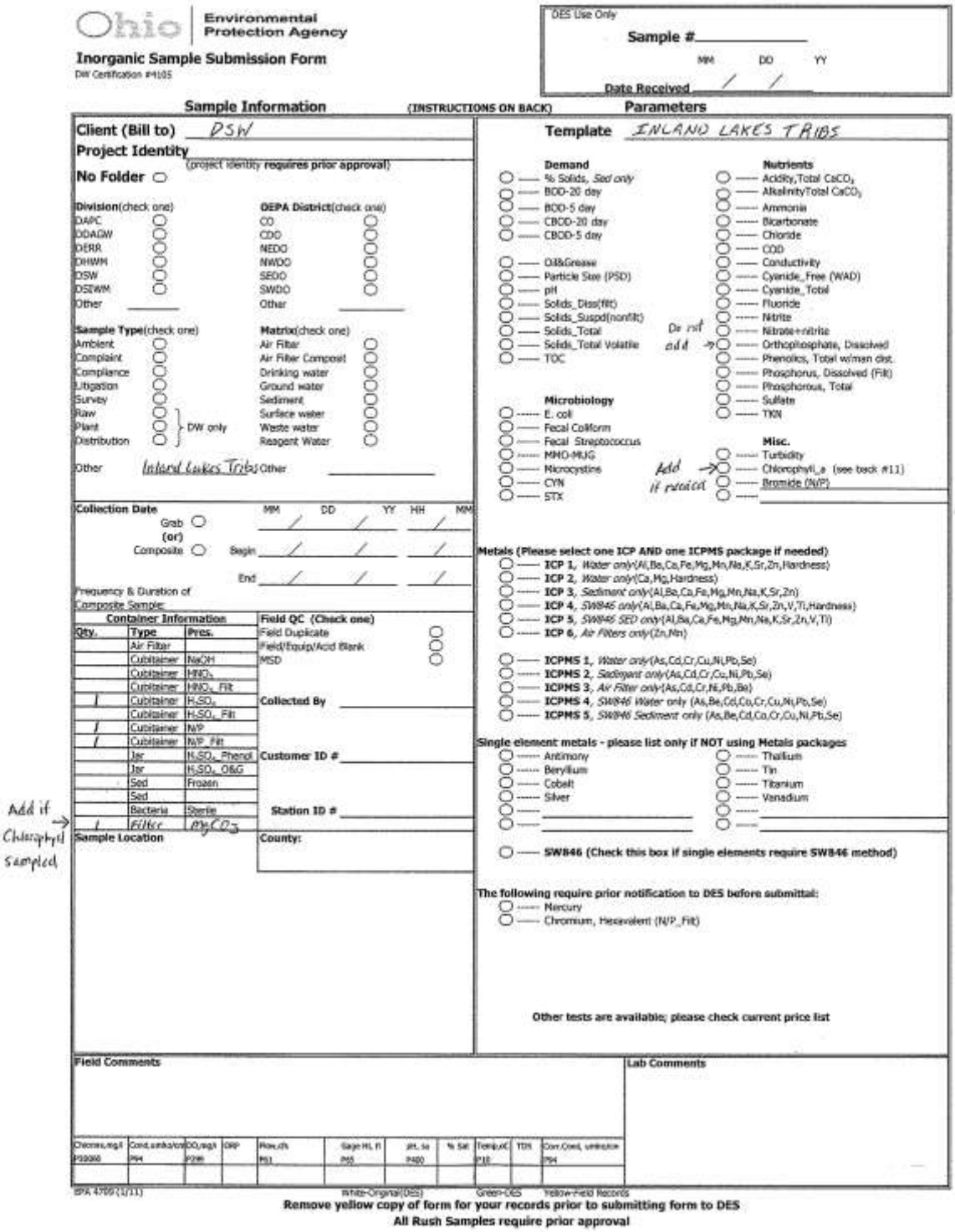
The following require **prior notification** to DES before submittal:
- O — Antimony, L L
- O — Beryllium, L L, Water,Sed, & Air only
- O — Cobalt, L L, Water,Sed, & Air only
- O — Copper L L, Water only
- O — Silver, LL
- O — Thallium, L L
- O — Tin, LL
- O — Mercury

Bioassay O

Field Comments: Bottom

Lab Comments

Chlorine, mg/L P50060	Conductivity P94	DO,mg/L P299	Flow,cfs P61	Gage Ht,ft P65	pH, su P400	% Sat	Temp,oC P10	Corr.Conductivity P94



Ohio Environmental Protection Agency

Inorganic Sample Submission Form

DW Certification #4105

DES Use Only
Sample #_____
MM DD YY
Date Received ___/___/___

Sample Information (INSTRUCTIONS ON BACK)

Client (Bill to) DSW

Project Identity
(project identity requires prior approval)

No Folder ○

Division (check one)		DEPA District (check one)	
DAPC	○	CO	○
DDAGW	○	CDO	○
DERR	○	NEDO	○
DHWM	○	NWDO	○
DSW	○	SEDO	○
DSEWM	○	SWDO	○
Other		Other	

Sample Type (check one)		Matrix (check one)	
Ambient	○	Air Filter	○
Complaint	○	Air Filter Composit	○
Compliance	○	Drinking water	○
Litigation	○	Ground water	○
Survey	○	Sediment	○
Raw	○	Surface water	○
Plant	○ DW only	Waste water	○
Distribution	○ DW only	Reagent Water	○
Other	Inland Lakes Tribs	Other	

Collection Date MM DD YY HH MM
Grab ○ ___/___/___ ___/___
(or)
Composite ○ Begin ___/___/___ ___/___
End ___/___/___ ___/___
Frequency & Duration of Composite Sample:

Container Information		
Qty.	Type	Pres.
	Air Filter	
	Cubitainer	NaOH
	Cubitainer	HNO_3
	Cubitainer	HNO_3 Filt
1	Cubitainer	H_2SO_4
	Cubitainer	H_2SO_4 Filt
1	Cubitainer	N/P
1	Cubitainer	N/P Filt
	Jar	H_2SO_4 Phenol
	Jar	H_2SO_4 O&G
	Sed	Frozen
	Sed	
	Bacteria	Sterile
1	Filter	$MgCO_3$

Add if Chlorophyll sampled →

Sample Location

Field QC (Check one)
Field Duplicate ○
Field/Equip/Acid Blank ○
MSD ○

Collected By

Customer ID #

Station ID #

County:

Parameters

Template INLAND LAKES TRIBS

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

Do not add →

Microbiology
- ○ E. coli
- ○ Fecal Coliform
- ○ Fecal Streptococcus
- ○ MMO-MUG
- ○ Microcystins
- ○ CYN
- ○ STx

Add if needed →

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

Misc.
- ○ Turbidity
- ○ Chlorophyll_a (see back #11)
- ○ Bromide (N/P)
- ○ ____

Metals (Please select one ICP AND one ICPMS package if needed)
- ○ **ICP 1**, *Water only* (Al,Ba,Ca,Fe,Mg,Mn,Na,K,Sr,Zn,Hardness)
- ○ **ICP 2**, *Water only* (Ca,Mg,Hardness)
- ○ **ICP 3**, *Sediment only* (Al,Ba,Ca,Fe,Mg,Mn,Na,K,Sr,Zn)
- ○ **ICP 4**, *SW846 only* (Al,Ba,Ca,Fe,Mg,Mn,Na,K,Sr,Zn,V,Ti,Hardness)
- ○ **ICP 5**, *SW846 SED only* (Al,Ba,Ca,Fe,Mg,Mn,Na,K,Sr,Zn,V,Ti)
- ○ **ICP 6**, *Air Filters only* (Zn,Mn)

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

Single element metals - please list only if NOT using Metals packages
- ○ Antimony
- ○ Beryllium
- ○ Cobalt
- ○ Silver
- ○ ____
- ○ ____
- ○ Thallium
- ○ Tin
- ○ Titanium
- ○ Vanadium
- ○ ____
- ○ ____

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

The following require prior notification to DES before submittal:
- ○ Mercury
- ○ Chromium, Hexavalent (N/P_Filt)

Other tests are available; please check current price list

Field Comments

Chlorine, mg/l	Cond, umhos/cm	DO, mg/l	ORP	Flow, cfs	Gage Ht, ft	Jet, sq	% Sat	Temp, oC	TDS	Corr.Cond, umhos/cm
50060	P94	P299		P61	P65	P480		P10		P94

Lab Comments

EPA 4789 (1/11) White-Original (DES) Green-DES Yellow-Field Records

Remove yellow copy of form for your records prior to submitting form to DES
All Rush Samples require prior approval

Example (Fill in *)

OhioEPA **Division of Environmental Services**
Chemistry Laboratory Chain of Custody Report

Date Received (Lab use only) Year Month Day

Collected by * Print

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

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

Date of Grab Sample * Y Y M M D D

Beginning and End Date of Composite Sample

Laboratory Number(s) (Lab use only)

Location(s) *

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

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

Additional Information/Comments * If needed

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

Number of Samples (Containers/Sites) *

Relinquished by * Signature (must match name of collected by ↑)
(must be collector*)

Received by

Relinquished by

Received by

Relinquished by

Received by

Relinquished by

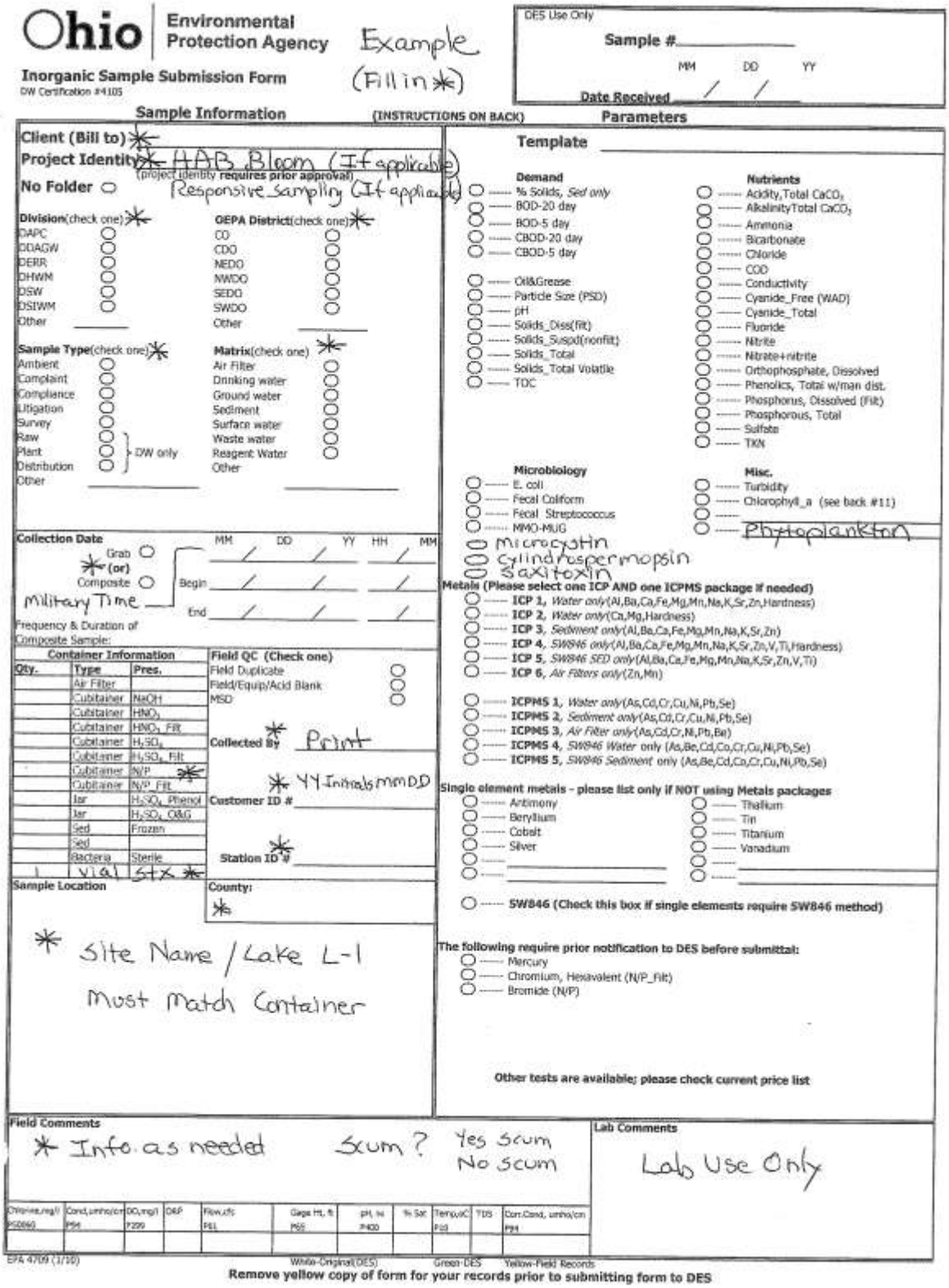
Received by

MILITARY TIME

*	Year	Month	Day	Hour	Minute

Distribution
White-Laboratory
Canary-Originator-After Lab Signature

EPA 4705



Ohio Environmental Protection Agency — Example (Fill in *)

Inorganic Sample Submission Form
DW Certification #4105

DES Use Only
Sample #_____
MM DD YY
Date Received ___/___/___

Sample Information (INSTRUCTIONS ON BACK)

Client (Bill to) *
Project Identity * HAB Bloom (If applicable)
(project identity requires prior approval)
No Folder ○ Responsive Sampling (If applicable)

Division (check one) *
DAPC ○
DDAGW ○
DERR ○
DHWM ○
DSW ○
DSIWM ○
Other ___

OEPA District (check one) *
CO ○
CDO ○
NEDO ○
NWDO ○
SEDO ○
SWDO ○
Other ___

Sample Type (check one) *
Ambient ○
Complaint ○
Compliance ○
Litigation ○
Survey ○
Raw ○
Plant ○ } DW only
Distribution ○
Other ___

Matrix (check one) *
Air Filter ○
Drinking water ○
Ground water ○
Sediment ○
Surface water ○
Waste water ○
Reagent Water ○
Other ___

Collection Date
Grab ○
* (or)
Composite ○
Military Time
MM DD YY HH MM
Begin ___/___/___ ___/___
End ___/___/___ ___/___
Frequency & Duration of Composite Sample:

Container Information

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

Field QC (Check one)
Field Duplicate ○
Field/Equip/Acid Blank ○
MSD ○

Collected By * Print
* YY Initials MM DD
Customer ID # ___
Station ID # *

Sample Location
* Site Name / Lake L-1
Must Match Container

County: *

Template ___

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

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

Microbiology
○ E. coli
○ Fecal Coliform
○ Fecal Streptococcus
○ MMO-MUG
○ Microcystin
○ Cylindrospermopsin
○ Saxitoxin

Misc.
○ Turbidity
○ Chlorophyll_a (see back #11)
○ ___
○ Phytoplankton

Metals (Please select one ICP AND one ICPMS package if needed)
○ ICP 1, Water only (Al,Ba,Ca,Fe,Mg,Mn,Na,K,Sr,Zn,Hardness)
○ ICP 2, Water only (Ca,Mg,Hardness)
○ ICP 3, Sediment only (Al,Ba,Ca,Fe,Mg,Mn,Na,K,Sr,Zn)
○ ICP 4, SW846 only (Al,Ba,Ca,Fe,Mg,Mn,Na,K,Sr,Zn,V,Ti,Hardness)
○ ICP 5, SW846 SED only (Al,Ba,Ca,Fe,Mg,Mn,Na,K,Sr,Zn,V,Ti)
○ ICP 6, Air Filters only (Zn,Mn)

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

Single element metals - please list only if NOT using Metals packages
○ Antimony
○ Beryllium
○ Cobalt
○ Silver
○ ___
○ ___
○ Thallium
○ Tin
○ Titanium
○ Vanadium
○ ___
○ ___

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

The following require prior notification to DES before submittal:
○ Mercury
○ Chromium, Hexavalent (N/P_Filt)
○ Bromide (N/P)

Other tests are available; please check current price list

Field Comments
* Info as needed
Scum? Yes Scum No Scum

Lab Comments
Lab Use Only

Chlorine,mg/l PS0860	Cond,umho/cm P94	DO,mg/l P299	O&P	Flow,cfs P61	Gage Ht, ft P65	pH, su P400	% Sat	Temp,oC P10	TDS	Corr.Cond, umho/cm P94

EPA 4/09 (1/10) White-Original (DES) Green-DES Yellow-Field Records
Remove yellow copy of form for your records prior to submitting form to DES

Chlorophyll a Sample Submission Form

Sample Submission Date: _____ Name/District/Division: _____

One sheet can be used for each batch of samples submitted to the lab regardless of when they were collected. Use the sheet for both water and rock scrape samples. Fill out the appropriate spaces for that particular sample you are collecting. Duplicate filters should be noted in the location. Field blanks should be labeled as such. Field blank should be submitted every 10 filters. ****REMINDER**** - All filters must be filtered in the field, placed in foil, labeled and frozen.

Location	Sample # (for lab use)	Collection Date	Time	Area Scraped (cm^2)	Slurry Volume (ml)	Volume Filtered (ml)

Field Comments: _____

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
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
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
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
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
PRESERVATIVE: Lugols 70% EtOH Other
COLLECTION METHOD: Int. Tube


2/13/2008
OFFICIAL USE
348L-1
17 - DEER CREEK
RESERVOIR L-1
SURFACE
H2SO4

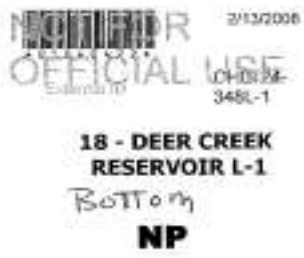

2/13/2008
OFFICIAL USE
348L-1
17 - DEER CREEK
RESERVOIR L-1
SURFACE
HNO3


2/13/2008
OFFICIAL USE
348L-1
17 - DEER CREEK
RESERVOIR L-1
SURFACE
NP


2/13/2008
OFFICIAL USE
348L-1
17 - DEER CREEK
RESERVOIR L-1
SURFACE
FILTERED H2SO4


2/13/2008
OFFICIAL USE
348L-1
18 - DEER CREEK
RESERVOIR L-1
BOTTOM
H2SO4


2/13/2008
OFFICIAL USE
348L-1
18 - DEER CREEK
RESERVOIR L-1
BOTTOM
HNO3


2/13/2008
OFFICIAL USE
348L-1
18 - DEER CREEK
RESERVOIR L-1
BOTTOM
NP


2/13/2008
OFFICIAL USE
348L-1
18 - DEER CREEK
RESERVOIR L-1
BOTTOM
FILTERED + H2SO4


2/13/2008
OFFICIAL USE
348L-1
19 - DEER CREEK
RESERVOIR L-1 Dup - A
COMPOSITE
H2SO4


2/13/2008
OFFICIAL USE
348L-1
19 - DEER CREEK
RESERVOIR L-1 Dup - A
COMPOSITE
NP


2/13/2008
OFFICIAL USE
348L-1
19 - DEER CREEK
RESERVOIR L-1 Dup - A
COMPOSITE
FILTERED- H2SO4


2/13/2008
OFFICIAL USE
348L-1
20 - DEER CREEK
RESERVOIR L-1 Dup - B
COMPOSITE
H2SO4


2/13/2008
OFFICIAL USE
348L-1
COMPOSITE
20 - DEER CREEK
RESERVOIR L-1 Dup - B
NP


2/13/2008
OFFICIAL USE
348L-1
20 - DEER CREEK
RESERVOIR L-1 Dup - B
COMPOSITE
FILTERED- H2SO4

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]

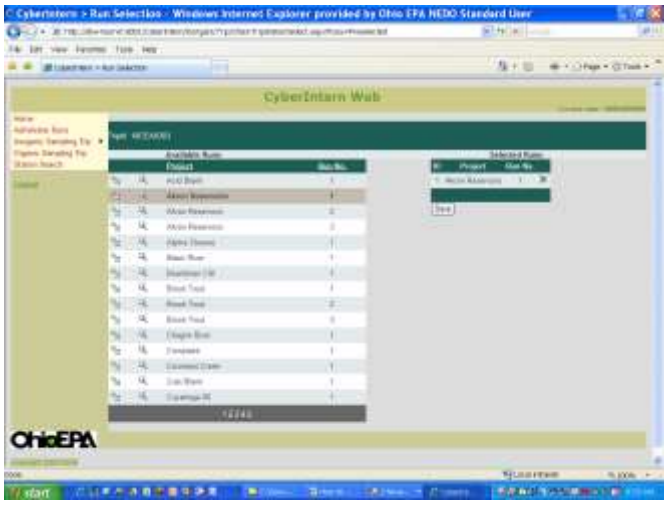
1. Create a "Survey" for Inland Lakes Sampling. Each lake can be an individual survey, or a master survey (e.g. "CDO Inland Lakes") can be used.

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.

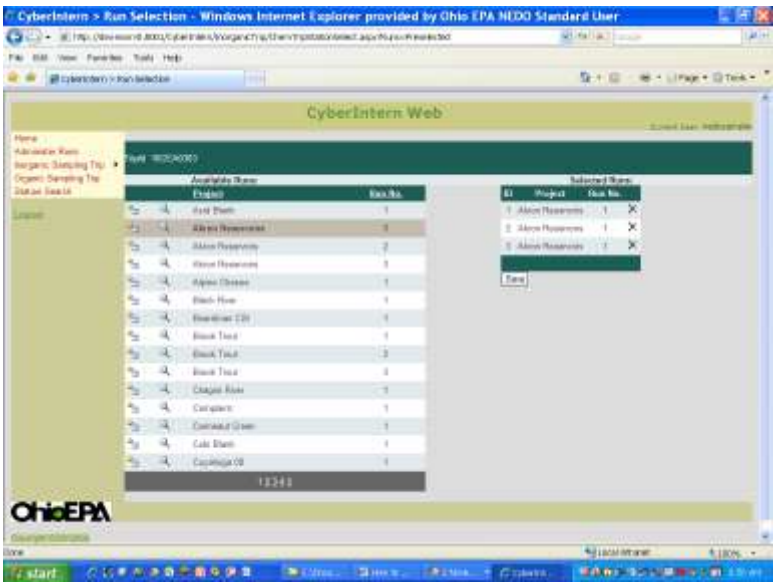
4. After entering the sampling information (date, division, location, crew leader, additional samplers, vehicle, and type of sampling), select the "Run" from the pick list *(e.g. "Inland Lakes-NEDO" Run 1)*. This will give 1 instance of the "Run" in the "Chosen Run(s)" field.

Example:



5. 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")*.

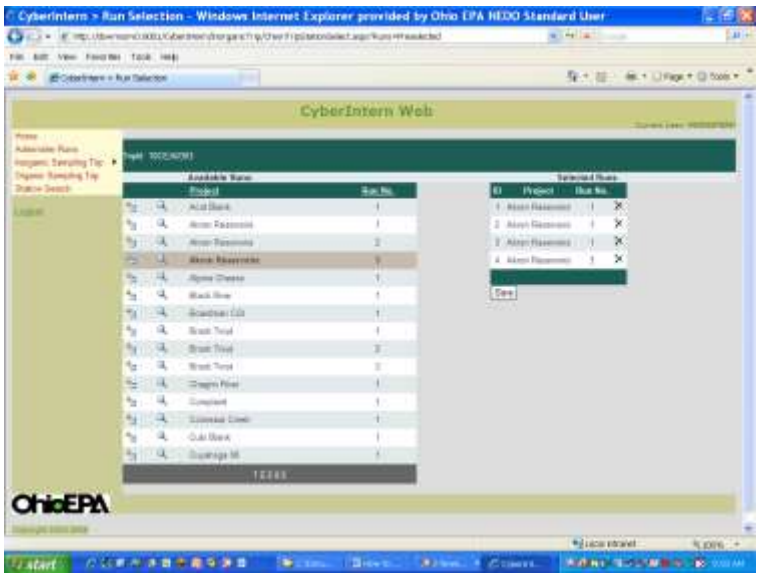
   Example (creation of a BATHTUB run for a lake, three instances of the same run selected – this will allow sampling at three depths):



   - NOTE 1: this **<u>does not</u>** 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

Phytoplankton and Cyanotoxin Sampling and Processing Procedures (Routine Inland Lakes Monitoring Program)

TERMINOLOGY

Contact Recreational Area – Water areas where swimming, wading, diving, jet skiing, water skiing, tubing, wakeboarding, windsurfing, kite boarding or any other in-water activity may occur that is likely to result in immersion or ingestion of water.

Coordinator – Inland Lakes Program Coordinator in Central Office, Division of Surface Water

MATERIALS

- Plastic gloves to the shoulder (to protect skin from toxin irritation)
- Chest Waders – if collecting samples by wading off the shore
- Life Jacket
- One or more 500 ml amber glass jar(s)(or1 quart-Cubitainers™) for raw water
- One 4 ounce glass jar for phytoplankton collection
- One 4-6 ounce amber glass jar for finished water
- Plastic bucket (for transect collection of 9 quarts of water for cyanotoxins)
- Floatation ring (to keep the collection bucket afloat)
- Stir rod (for stirring composite cyanotoxin sample)
- Box of Cubitainers
- Yardstick or weighted measuring tape
- Digital camera to record appearance of bloom
- GPS
- Multi-probe meter
- 2-m vertical integrated tube sampler
- Cooler with wet 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
- Foil
- FedEX or UPS shipping labels (if UPS, use the 400473 shipping code)
- Phone list of contacts

SAFETY MATERIALS

Gloves (preferably shoulder length) should be worn when sampling an algae bloom. A life jacket and chest waders should also be worn when collecting samples of an algae bloom by wading out from the shore. Because cyanotoxins may be present in water droplets and carried by the wind, avoid inhaling spray from boats or wind. Wear goggles and a face mask to protect your eyes and nose.

PREPARATION FOR COLLECTION

Collect the cyanotoxin sample(s) and freeze until you get clearance to have the sample(s) shipped and processed.

NOTE: Samples collected in response to an observed HAB in a contact recreation area or near an intake will be collected in accordance with the procedures outlined in Attachment 7.

PROCEDURE FOR COLLECTION, PRESERVATION, PROCESSING, QA/QC, PAPERWORK, SHIPPING

The protocol described below is specific to the Inland Lakes Monitoring Program. It is designed to give an overview of the species or genera with detailed cell counts of phytoplankton populations that dominate in the spring and/or fall, and to determine the genera of cyanobacteria that may bloom during the spring and summer, with any potential associated toxins.

Typically, five sampling events are conducted each year for two years in each lake in order to characterize cyanobacteria dynamics. It is not a responsive type of sampling to protect public health as described Attachment 7.

(Note: If blooms are sighted in recreational or source waters away from the established Inland Lake Program sampling locations, then the Inland Lakes Team will collect additional phytoplankton and cyanotoxin samples following the protocol outlined in Attachment 7 for those locations (beaches or open water.) Those samples will be shipped immediately to DES (not to the coordinator).

I. Inland Lakes Program Phytoplankton Collection Protocol

A sample for cyanobacteria genera/species identification shall be collected by placing a subsample of whole water collected using a 2-m vertical integrated-tube sampler into clean bucket and take a subsample in a 4 oz glass jar. Preserve the sample with a 1% Lugol's solution. The preserved sample should have the color of weak tea. Wrap the bottle with foil (if you are not using an amber bottle) and keep cool. Put the sample in a cooler on ice. Do not freeze. Label the sample as a scum or non-scum sample.

- Record the date, military time, water temperature, pH, and dissolved oxygen at the time of sample collection. Also collect a dissolved phosphorus sample if possible.

II. Inland Lakes Program Cyanotoxin Collection Protocol

A sample for analysis of microcystin (or other cyanotoxin as indicated by the coordinator) shall be placed in a 1 quart Cubitainer™ filled at least half way, but not over-filled to allow for expansion if the sample is ultimately frozen. The sample should be immediately placed in the dark on wet ice. If the sample cannot be analyzed within 36 hours, freeze the sample.

- When indicated by the coordinator, a sample for saxitoxin analysis shall be placed in 40 ml glass vial pre-dosed with a preservative supplied by DES. The sample should be immediately placed in the dark on wet ice. When freezing a saxitoxin sample, after the vial is filled and mixed with the preservative, one half of the sample should be decanted off to allow space for expansion. The vial should be laid on its side for freezing.

- If a toxin sample will not be analyzed within 36 hours, it must be frozen to preserve the toxin. If you cannot get the sample to DES within 24 hours and by Thursday noon, keep the sample frozen until ready to ship early the following week.

III. Sample Collection

- Collect a composite phytoplankton sample from location L-#; preserve with Lugol's iodine .Wrap the bottle with foil (if you are not using an amber bottle) and keep cool. Immediately send the sample to the coordinator (for first and fifth sampling event collections only).

- Also collect a set of samples for cyanotoxin analysis at location L-# and freeze until the organisms can be identified. If results from the phytoplankton analysis and cell counts suggest cyanotoxin analysis is needed, the coordinator will instruct you to ship the sample to a specified laboratory. Otherwise, the coordinator will notify you that the frozen sample can be discarded.

- If a HAB is noted in another part of the lake, especially along the shore in the vicinity of a beach or drinking water intake, also collect phytoplankton and toxin samples in accordance with Attachment 7. Send these phytoplankton samples and cyanotoxin samples to DES (not the coordinator).

- If a HAB is noted in the vicinity of a drinking water intake, collect phytoplankton and toxin samples in accordance with the protocol outlined in Attachment 7. In addition, **after** coordinating with the **district drinking water inspector** (if available) **and** the **PWS operator**, collect a finished water sample in the PWS plant. If you were unable to notify the district drinking water inspector, then notify him/her as soon as you can after collecting the finished water sample. The raw water toxin sample and the toxin sample from the finished water are immediately placed on ice and sent to DES for analysis. The samples must be received by the laboratory by close of business on Fridays. Call the sample coordinator to make arrangements for the receipt of the sample. If the samples cannot be received by close of business on Friday the toxin sample must be frozen and the phytoplankton sample refrigerated until shipment to DES the following week.

IV. Sample Collection Event 2, 3, and 4 for Recreational and Source Water Lakes

- **If** there is an algae bloom observed at **L-#** or anywhere in the lake, collect a phytoplankton sample and send it to DES for analysis. Also collect and freeze a toxin sample from the bloom location. The coordinator will let the district know if the toxin sample should be analyzed after the initial review of the cyanobacteria assemblage.

- Again, **if** a HAB is noted in the vicinity of an intake, collect phytoplankton and toxin samples in accordance with the protocol outlined in Attachment 7. In addition, **after** coordinating with the district drinking water inspector (if available) **and** the PWS operator, collect a finished water sample in the PWS plant. If the district drinking water inspector was unable to be notified, do so as soon as possible after collecting the finished water sample. The raw water toxin sample from the intake and the toxin sample from the finished water are immediately placed on ice and sent to DES for analysis.

V. Toxin Preservation Instructions

If samples will be processed within 36 hours, they should be kept in the dark and on ice. If a sample will not arrive for processing at the laboratory within 24 – 36 hours, the sample must be frozen in a standard freezer until it is shipped for processing.

VI. Phytoplankton Preservation Instructions

Unpreserved phytoplankton samples can be held for up to eight hours if kept in the dark and on ice prior to either preservation with Lugol's or analyzed. Addition of Lugol's iodine (1 ml Lugol's iodine to 100/ml sample) will allow for longer preservation. Wrap the bottle with foil (if you are not using an amber bottle) and keep cool.

VII. Toxin Processing Instructions:

- Total toxin shall be determined for recreational and raw public water system sample analysis. Samples must be processed to ensure all algal cells are lysed which should be verified through microscopic observation. Using an ultrasonicator is a good way to lyse algal cells; however care must be employed to prevent any loss of the toxin while sonicating. This will mean careful selection of the processing parameters for the type of sonicator used, and possibly sonicating the sample in a cold water bath.

- Finished drinking water samples generally will not be sonicated as it is not expected that algal cells will be present in the finished drinking water. Free toxin concentrations in finished drinking water should be determined.

VIII. QA/QC

- Use de-ionized water to rinse the integrated tube sampler prior to collecting the first sample.

- Collect the sample with the integrated tube sampler and dispense in a collection container.

- Go to the next sampling location and rinse the entire sampler three times in lake water at the new location.

- Collect a sample in an adjacent area to where the sampler was rinsed.

IX. Paperwork

Fill out a Chain of Custody Report and the Sample Submission Form. Put the paperwork in double ziplock-type bags and seal each bag well. Place the paperwork on the samples in the cooler or in the outside pocket on the cooler for the courier. Note that ice packs should be used if shipping FedEx and wet ice sealed in plastic bags or ice packs for UPS shipments.

X. Shipping

- Contact the appropriate laboratory prior to shipping samples. Include paperwork required by each of these laboratories including a Chain of Custody Report and make sure that the data is reported to you and to the HAB Coordinator so that data can be entered into the Ohio EPA database.

- Enclose each sample container in a separate sealed plastic bag. Place in ice in a sealed plastic bag and place in the shipping container. Prepare the package for shipment.
- If shipping to the Ohio EPA DES, ship the samples for same day or overnight delivery to DES Sample Coordinator at the DES laboratory. Contact the Sample Coordinator before shipping. Phytoplankton should not be frozen, but kept cool and in the dark until processed.

ATTACHMENT 7

Phytoplankton and Cyanotoxin Sampling and Processing Procedures (Responsive Sampling)

Terminology

Contact Recreational Area – Water areas where swimming, wading, diving, jet skiing, water skiing, tubing, wakeboarding, windsurfing, kite boarding or any other in-water activity may occur that is likely to result in immersion or ingestion of water.

Coordinator – Inland Lakes Program Coordinator in Central Office, Division of Surface Water

MATERIALS

- Plastic gloves to the shoulder (to protect skin from toxin irritation)
- Chest Waders – if collecting samples by wading off the shore
- Life Jacket
- One or more 500 ml amber glass jar(s)(or1 quart-Cubitainers™) for raw water
- One 4 ounce glass jar for phytoplankton collection
- One 4-6 ounce amber glass jar for finished water
- Plastic bucket (for transect collection of 9 quarts of water for cyanotoxins)
- Floatation ring (to keep the collection bucket afloat)
- Stir rod (for stirring composite cyanotoxin sample)
- Box of Cubitainers
- Yardstick or weighted measuring tape
- Digital camera to record appearance of bloom
- GPS
- Multi-probe meter
- 2-m vertical integrated tube sampler
- Cooler with wet 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
- Foil
- FedEX or UPS shipping labels (if UPS, use the 400473 shipping code)
- Phone list of contacts

SAFETY MATERIALS

Gloves (preferably shoulder length) should be worn when sampling an algae bloom. A life jacket and chest waders should also be worn when collecting samples of an algae bloom by wading out from the shore. Because cyanotoxins may be present in water droplets and carried by the wind, avoid inhaling spray from boats or wind. Wear goggles and a face mask to protect your eyes and nose.

PROCEDURE FIR COLLECTION, PRESERVATION, PROCESSING, QA/QC, PAPERWORK, SHIPPING

If a HAB is observed in the vicinity of a contact recreation area or at Public Water Supply Plants when sampling at the standard Inland lakes monitoring locations, additional phytoplankton and cyanotoxin samples should be collected in those locations in accordance to the procedures outlined below. The first procedure is an excerpt from the State of Ohio Harmful Algal Bloom Response Strategy for Recreational Waters. The second procedure is an excerpt from the Drinking Water HAB Response Strategy:

I.Label Information (applies to Recreational and Sampling at PWSs)

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

Site Name(Station ID)
Date
Time
Preservative (if applicable)

II. Sample Collection

Beaches

Phytoplankton Sample Collection at Beaches

The purpose of collecting phytoplankton samples is to identify the organism to determine if the bloom consists of cyanobacteria or another organism. If it is not a cyanobacteria bloom, then no Algal Advisory sign would be posted. If the bloom is cyanobacteria, then the type of cyanobacteria will determine which cyanotoxins should be analyzed.
If the location of the bloom is evident (i.e. at the surface or just below the surface), collect a grab sample from the densest part of a bloom. The grab sample should be collected in a 4 ounce glass jar. If the bloom is not at a distinct location, but diffuse throughout the water column, use an integrated tube sampler that includes a collection for a range of depth. Empty the tube sampler into a clean bucket and take a subsample with a 4-ounce glass jar.If collecting a scum, collect a grab sample with a 4 ounce glass jar from the scum-water surface interface.

If you suspect the presence of benthic cyanobacteria, collect a sample in a 4 ounce glass jar near (at 1 foot above) the bottom where you believe the benthic cyanobacteria is located.

Ideally samples should be preserved at the time of collection with Lugol's iodine solution at a ratio of 1:100 although Lugol's can be added to a sample anytime within eight hours. To achieve a 1:100 ratio add about 1 ml of Lugol's solution per 100 ml of sample. (Final Lugol's solution in a sample should be 1%.) Final preserved sample color should be similar to that of weak tea. Wrap the bottle with foil (if you are not using an amber bottle) and keep cool. Ship for delivery to the laboratory, such as Ohio EPA's DES. Samples should be kept on wet ice and in the dark during transport. **Do not freeze the phytoplankton sample - doing so will make identification difficult.**

Cyanotoxin Sample Collection at Beaches-Overview

The purpose of collecting cyanotoxin samples is to determine if a Public Health Advisory or No Contact Advisory (if there are probable human illnesses or pet deaths) should be posted.

Samples will be collected from nine locations within the designated recreational area and composited. The nine locations will be determined by evenly dividing the recreational area into three transects that begin at the beach and extend into the water. Samples will be collected from three locations (ankle, knee and hip deep) along each transect. (Note: use a rod ahead of where you are walking to gauge depth. Do not stir up the sediment. If the depth drops off quickly past hip depth, then just collect the ankle-depth and knee depth samples. Do not go past hip depth.) Wade slowly (as not to stir bottom substrate) to the sampling locations. Avoid collecting suspended sediment that may be kicked up while accessing the sampling point. Ankle-deep water samples will be collected approximately 15 cm below the surface. Knee- and hip-deep water samples will be collected approximately 30 cm below the surface. If dense cyanobacterial accumulations are present outside of the transect locations (which includes a scum or heavy biomass in the photic zone), an additional sample will be collected from the densest accumulation by filling a separate clean 1-quart Cubitainer™ or other Ohio EPA-approved container half way (500 ml). Submit this sample in addition to the composited samples with a separate Sample Submission Form and clearly marked as scum (adapted from USGS, 2008).

Cyanotoxin Sample Collection Instructions

1) Use a clean 1-quart Cubitainer™ or other Ohio EPA approved container to collect from each sampling point along all three transects at a beach location. Carry the clean bucket with you (or you can place a float around the bucket). Fill the 1-quart Cubitainer™ or other Ohio EPA-approved container from the ankle-depth location on the first transect and completely dispense the collection into the bucket. Carefully wade out to the knee-depth location with the bucket and collect another 1-quart sample using the same Cubitainer™ or other Ohio EPA-approved container. Completely dispense the sample into the bucket. Then wade out to hip depth and collect another 1-quart sample and completely dispense the collection into the bucket.

2) Go to the second transect. Using the same 1-quart Cubitainer™ or other Ohio EPA-approved container, collect the three samples along the second transect in the same way the samples were collected along the first transect and dispense them into the bucket with the first transect collections. Once the second transect collections are dispensed into the bucket, go to the third transect and collect the three samples along the third transect in the same way collections were made on the first two transects and dispense into the bucket.
3) Use a clean stirring rod to mix the composite samples from all three transects in the bucket. Continue to stir the composite sample while you dispense a sub-sample of the composite sample into the same 1-quart Cubitainer™ or other Ohio EPA-approved container you used to collect all the samples at that beach. This is the sample you will submit to the laboratory.

4) In addition, if a scum is found at any area where the public is expected to recreate outside the transect lines, collect a surface grab sample which includes the scum at the scum-water interface and clearly noted on the container label. Note the percentage of recreational area covered by the scum on your Sample Submission Form. This sample is **not** mixed into the composite sample but submitted to the laboratory in addition to the composite sample.

5) Immediately transfer each capped sample to a dark cooler on wet ice or ice packs when collected. The sample must be kept in the dark and cool to preserve any toxin that may be present.

If there are multiple beaches on a single lake with cyanobacteria blooms, all beaches should be sampled in the same manner as stated above, differentiating each sample

location by an alternate location name. When you move to a new beach location to set up new transects, rinse the collection bucket and stirring rod three times with lake water at each location. Rinse away from the transect sampling points so as not to cross contaminate or mix the water where samples will be collected. Use a new, clean 1-quart Cubitainer™ or other Ohio EPA-approved container for each different beach sampled.

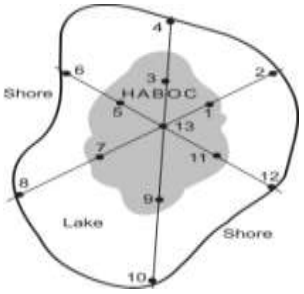
Open Water (Inland Lakes)

Open water sampling is not prescribed by this Strategy, but if it is deemed necessary, this section describes the methodology for collecting samples.

Establish a **central sampling point** in the approximate center of a HAB on the open lake and record the latitude and longitude. Each time an open-water HAB sample is collected, there will probably be a different central sampling location and those coordinates should be recorded each time. Collect phytoplankton and toxin samples.
Choose one of the following methods that will best capture the extent of the HAB.

Radial Transect Method (for irregular-shaped, or elongated HABs)

Project three transects through the central sampling point ensuring there are six equal arcs radiating from the central sampling point. Extend each of the six radial arms to the shore. Along each of the six radial arms, divide each into two equal length segments with two equally spaced sampling points (not counting the central sampling point.)



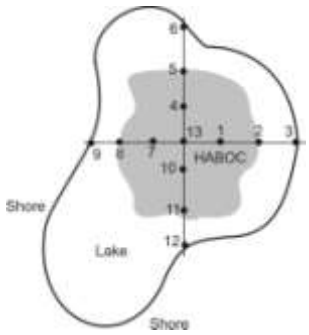
For Phytoplankton Samples

Using an integrated tube sampler, collect a phytoplankton sample from the densest bloom area and dispense the sample into a Cubitainer™ or other Ohio EPA-approved container or a clean bucket. Take a 1-quart Cubitainer™ or other Ohio EPA-approved container or sub-sample for analysis. Collect additional separate samples of blooms that have a different appearance if applicable and note the latitude and longitude of each collection. Note if a scum is included in the collection. Preserve with Lugol's iodine (1 ml Lugol's solution to 100 ml sample). Wrap the bottle with foil (if you are not using an amber bottle) and keep cool.

For Cyanotoxin Samples

Collect a grab toxin sample in a rinsed 1-quart Cubitainer™ or other Ohio EPA-approved container at each collection point. Rinse by filling the 1-quart Cubitainer™ or other Ohio EPA-approved container with native water on the opposite side of the boat from where the collection will be made. Collect 1 quart sample from the photic zone where there is the highest concentration of cyanobacteria at each sampling location. If there is a surface scum, collect a surface sample (scum-water interface) at that location. If it is unclear where the highest concentration of phytoplankton is located in the water column, then collect a grab sample from approximately 15 cm below the surface. Combine a sample collected from the central sampling point to the 12 sample collections along each of the six radial arms in a clean churn splitter or clean bucket. Mix the composite sample in the churn splitter or in the bucket with a clean stirring rod and continue to mix while decanting a sub-sample into the 1-quart collection Cubitainer™ or other Ohio EPA-approved container.
If saxitoxin analysis is ordered, collect a sample form the churn splitter or clean bucket in a 40 ml glass vial pre-dosed with preservative from DES.
Important - The composite sample should be placed on wet ice or ice packs in a cooler as soon as possible.

Perpendicular Transect Method (For regular-shaped, or round HABs)



Establish two transects that cross at right angles through the central sampling point. Extend each transect end to the shore. Along each of the four radial arms, divide each into three equal length segments with three equally spaced sampling points (not counting the central sampling point.)

For Phytoplankton Samples

Using a vertical-integrated tube sampler, collect a phytoplankton sample from the densest bloom area and dispense the sample in a clean bucket. Collect a subsample in a clean 1-quart Cubitainer™ or other Ohio EPA-approved container. Collect additional separate samples of blooms that have a different appearance if applicable and note the latitude and longitude of each collection. Note if a scum is included in the collection. Preserve with Lugol's iodine (1 ml Lugol's solution to 100 ml sample). Wrap the bottle with foil (if you are not using an amber bottle) and keep cool.

For Cyanotoxin Samples

Collect a cyanotoxin grab sample in a rinsed 1-quart Cubitainer™ or other Ohio EPA-approved container at each collection point. Rinse by filling the 1-quart Cubitainer™ or other Ohio EPA-approved container with native water on the opposite side of the boat from where the collection will be made. Collect a 1-quart sample from the photic zone where there is the highest concentration of cyanobacteria at each sampling location. If there is a surface scum, collect a surface sample (scum-water interface) at that location. If it is unclear where the highest concentration of phytoplankton is located in the water column, then collect a grab sample from approximately 15 cm below the surface. Combine a sample collected from the central sampling point to the 12 samples collected from the transect arms in a clean churn splitter or clean bucket. Mix the composite sample in the churn splitter or in the bucket with a clean stirring rod and continue to mix while decanting a sub-sample into the 1-quart collection Cubitainer™ or other Ohio EPA-approved container.

If saxitoxin analysis is ordered, collect a sample form the churn splitter or clean bucket in a 40 ml glass vial pre-dosed with preservative from DES. **Important - The composite sample should be placed on wet ice or ice packs in a cooler as soon as possible.**

Public Water Supply Plants

Sample Location

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

Notification and Coordination

If a HAB is noted in the vicinity of an intake, collect phytoplankton and cyantoxin samples. In addition, **after** coordinating with the district drinking water inspector (if available), the PWS HAB coordinator **and** the PWS operator, collect a finished water sample in the PWS plant. If the district drinking water inspector was unable to be notified, do so as soon as possible after collecting the finished water sample. The raw water toxin sample from the intake and the toxin sample from the finished water are immediately placed on ice and sent to DES for analysis.

The samples must be received by the laboratory no later than Thursday 12:00 (noon). Otherwise the toxin sample must be frozen and the phytoplankton sample refrigerated until shipment to DES the following week.

III. Cyanotoxin Preservation Instructions

Upon collection, samples should be immediately put in a cooler in the dark and on wet ice. If a sample will not arrive for processing at the laboratory within 24 - 36 hours, the sample must be frozen in a standard freezer until it is processed. Samples received at DES frozen will take four hours for quart containers or smaller to thaw.

IV. Phytoplankton Preservation Instructions

Ideally samples should be preserved at the time of collection with Lugol's iodine solution at a ratio of 1:100, although Lugol's iodine can be added to a sample anytime within eight hours. Addition of Lugol's iodine will allow for extended preservation. Wrap the bottle with foil (if you are not using an amber bottle) and keep cool.

Equipment Decontamination Between Sampling Locations

When sampling for phytoplankton or algal toxins at different contact recreational areas, use clean cubitainers and rinse the collection bucket and stirring rod three times with lake water at each location. Rinse away from the transect sampling points so as not to cross contaminate or mix the water where samples will be collected.

V. Toxin Processing Instructions

Total toxin (free toxins and bound toxins) shall be determined for recreational water sample analysis. Free toxin shall be determined for finished drinking water. Total toxin samples will be processed to ensure all algal cells are lysed, which should be verified through microscopic observation. Utilizing an ultrasonicator is a good way to lyse algal cells, however care must be employed to prevent any loss of the toxin while sonicating. This will mean careful selection of the processing parameters for the type of sonicator used, and possibly sonicating the sample in a cold water bath.

VI. QA/QC

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

VII. Paperwork

Fill out a Chain of Custody Report and Sample Submission Forms (one for each sample). Put the paperwork in double ziplock-type bags and seal each bag well. Place the paperwork on the samples in the cooler.

VIII. Shipping

- Contact the appropriate laboratory prior to shipping samples. Include paperwork required by each of these laboratories including a Chain of Custody Report and make sure that the data is reported to you and to the HAB Coordinator so that data can be entered into the Ohio EPA database.
- Enclose each sample container in a separate sealed plastic bag. Place in ice in a sealed plastic bag and place in the shipping container. Prepare the package for shipment.
- If shipping to the Ohio EPA DES, ship the samples for same day or overnight delivery to DES Sample Coordinator at the DES laboratory. Contact the Sample Coordinator before shipping. Phytoplankton should not be frozen, but kept cool and in the dark until processed.

ATTACHMENT 8

Protocol for Processing Phytoplankton and Cyanotoxin Sample Submissions at DES

Terminology:

Responsive HAB sampling - When samples are taken from finished water during a bloom event, or from a bloom at an intake , beach or other contact recreation area

Contact Recreation Area – Water area where swimming, wading, diving, jet skiing, water skiing, tubing, wakeboarding, windsurfing, kite boarding, or any other in-water activity may occur that is likely to result in immersion or ingestion of water.

Processing Protocol: For Responsive HAB sampling (should be identified on the Sample Submission Form and collection container)

Phytoplankton samples will be preserved with Lugol's iodine within 8 hours of collection if possible. Un-preserved phytoplankton samples, will be immediately preserved with Lugol's iodine upon receipt at DES. A notation on the Sample Submission Form shall include the time of collection and the time of Lugol's solution was added to the sample if preserved at DES. Any phytoplankton samples not preserved within 8 hours of collection will have qualified results.

All phytoplankton samples submitted with cyanotoxin samples shall be reviewed under a light microscope to determine the relative ratio of different phytoplankton. All cyanotoxin samples will be analyzed for microcystin. However, if there are at least 10,000 cells/ml of cyanobacteria that can produce cylindrospermopsin (including *Cylindrospermopsis, Raphidiopsis, Anabaena, Aphanizomenon*, or *Lyngbya*), the cyanotoxin sample will also be processed for cylindrospermopsin. Follow-up cyanotoxin samples for these types of blooms should continue to be analyzed for cylindrospermopsin until told otherwise by DDAGW or DSW.

If a phytoplankton sample is not submitted with a cyanotoxin sample, microcystin and any other cyanotoxin sample requested by DSW or DDAGW on the Sample Submission Form will be analyzed.

Cyanotoxin samples from raw water will by sonicated pior to analysis. Cyanotoxin samples from finished water will not be sonicated prior to analysis.

Samples shall be analyzed for cyanotoxins within 24 hours of receipt if the chief of DSW or DDAGW (or their alternate) approve of expedited processing and reporting of results. For non-expedited processing of samples collected for responsive sampling, samples shall be analyzed for cyanotoxin within 36 hours of receipt. If cyanotoxin samples cannot be processed within 36 hours of collection, samples shall be frozen until they can be processed.

ATTACHMENT 9 (A)

Data Quality Objectives – Sediment

(See Lake Sampling Procedures - Sediment Samples)

Table 1. PAH Final Chronic Values and Maximums

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

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

Percentile	13 PAH Uncertainty factor	23 PAH Uncertainty factor
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, Office of Research and Development, November 2003, EPA/600/R-02/013.
http://www.epa.gov/nheerl/publications/files/PAHESB.pdf

ATTACHMENT 9(B)

Data Quality Objectives – Water Column

(See Lake Sampling Procedures – Water Samples)

1) Water Quality Standards

Ohio Adminstrative Code 3745-1-07

2) MDLs and RLs

http://epaintra.epa.state.oh.us/des/html/limits__rls___mdls_.html

Note: The correct Metal RLs are as follows:

OhioEPA Division of Environmental Services

Reporting Limits

DRINKING WATER

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

AQUEOUS, SURFACE WATER, WASTEWATER

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

ATTACHMENT 9 (C)

Data Quality Objectives– Phytoplankton, Cyanotoxin, Zooplankton

(See Lake Sampling Procedures - Plankton Samples)

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 Lugols Iodine.

Cyanotoxin:

Ohio EPA developed thresholds for several cyanotoxins which are detailed below:

Threshold (µg/L)	Microcystin*	Anatoxin-a	Cylindrospermopsin	Saxitoxin*
Recreational Public Health Advisory	6	80	5	0.8
Recreational No Contact Advisory	20	300	20	3

Zooplankton:

Collect sample with am 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.