

7.04

**STANDARD OPERATING PROCEDURES
FOR THE COLLECTION AND PRESERVATION
OF LAKE OR NON-WADEABLE WETLAND WATER COLUMN SAMPLES
FOR CHEMICAL ANALYSIS**

Summary

Water column samples should be reflective of the whole lake. To be representative of the lake, samples must be carefully collected, properly preserved and appropriately analyzed. In general, two to four samples at various depths are collected from the deepest area of the lake.

Equipment and Supplies

- Non-metallic Kemmerer or Van Dorn sampler, with rope marked at 1-meter depth intervals and a messenger.
- Sample containers.
- Acid for sample preservation.
- Sample labels.
- Cooler with ice or frozen gel packs.
- Deionized water for sample blanks and decontamination.
- Filter apparatus.
- For vacuum method.
 - Vacuum filter holder.
 - Vacuum pump.
 - 0.45 µm membrane filters (Millipore HAWP 047 00 or equivalent).
 - Pre-filters (Millipore AP40 0047 05 or equivalent).
 - Plastic forceps.
- For peristaltic method.
 - Power Drive (Compact Cat No. P-07533-50 or equivalent).
 - Peristaltic head (Easy Load II Cat No. P-77200-62 or equivalent).
 - Inline 0.45 µm cartridge filters (Geotech dispos-a-filter or equivalent).
 - Inline 5.0 µm cartridge pre-filters (Geotech dispos-a-filter or equivalent).
 - Tubing (Masterflex silicone Cat No. P-96400-24 or equivalent).
 - Churn Splitter.
- Field report form (Figure 7.04.1).
- Sample ID/Custody Record (Figure 7.04.2).
- Field sample log forms (Figure 7.04.3).
- Sample labels (Figure 7.04.4)
- Ballpoint pen “Black” or pencil.
- Power ice auger (winter sampling).
- Ice skimmer (winter sampling).
- Sled (winter sampling).

Water Quality Sample Collection Procedure

Following collection of the temperature/dissolved oxygen profile determine sample collection depths by following these general rules:

1. For lakes or wetlands four meters deep or less collect two samples, one sample at the one meter depth interval and the other sample approximately one meter off the bottom.
2. On lakes that are greater than four meters deep determine if and at what depth it is thermally stratified.
3. If the lake is not thermally stratified collect three samples: one at the one-meter depth interval, one at mid-depth, and the last sample one meter off the bottom.
4. If the lake is thermally stratified, collect three samples: one at the one-meter depth interval (epilimnion), one located one meter below the thermocline (metalimnion) and the last sample one meter off the bottom (bottom of hypolimnion). In some cases, an additional sample can be collected just above the thermocline (bottom of epilimnion).
5. Collect the samples beginning with the one-meter depth interval and progressing down the water column. Triple rinse each sample bottle using lake water from the sample depth interval. Fill each sample bottle. Preserve the nutrient samples to a pH of 2 with 2 ml 1/5th sulfuric acid. Preserve the ICP metals or ICP and trace metals samples to a pH of less than 2 with 2 ml concentrated nitric acid. Note: Do not preserve the total dissolved phosphorus sample until after filtration.
6. Place a label on each sample container (Figure 7.04.4). Each sample container should be labeled accordingly with the appropriate analyte group as indicated in Table 3.1.
7. Place the samples in a cooler on ice.
8. Fill out the field report form (Figure 7.04.1), Sample ID/Custody Record (Figure 7.04.2), and the water column chemistry sample log (Figure 7.04.3).

Field Bottle Blank Sample Collection

1. Field blanks are collected with the first and every tenth sample (i.e., 1, 10, 20....).
2. Triple rinse each bottle with deionized water.
3. Fill each bottle with deionized water.
4. Preserve each sample appropriately. Note: Do not preserve the total dissolved phosphorus sample until after filtering.
5. Place a label on each sample container (Figure 7.04.4). Note: Field bottle blanks samples are identified with STORET number 389990. Be sure to indicate on the label the lake name, associated site identification number and the depth of the sample being duplicated.

6. Place the sample in a cooler on ice.

Field Duplicate Sample Collection

Field duplicate samples are collected on the first sample and every tenth sample (i.e., 1, 10, 20....). When the sample log indicates a duplicate sample is to be collected, follow the steps below.

1. Collect the sample by following steps 2 through 9 in the procedure for Field Sample Collection above.
2. Place a label on each sample container (Figure 7.04.4). Note: Field duplicate samples should be identified with STORET number 389999. Be sure to indicate on the label the lake name, associated site identification number and the depth of the sample being duplicated.
3. Place the samples in a cooler on ice.

Field Sample Filtration Vacuum Method

1. Unpreserved total dissolved phosphorus samples should be filtered immediately.
2. Remove filter holder from the plastic bag and assemble.
3. Put on new latex or nitrile gloves.
4. Rinse the filter apparatus three times with approximately 250 ml of deionized water each time.
5. Load a pre-filter in the filter apparatus and connect the vacuum pump.
6. Leach the filter twice with approximately 250 ml of deionized water each time.
7. Filter the sample through the pre-filter. Place the sample back into the sample container.
8. Remove the pre-filter from the filter apparatus and repeat Step 3.
9. Load a 0.45 μm filter into the filter apparatus and connect the vacuum pump.
10. Repeat Step (6).
11. Filter the sample through the 0.45 μm filter.
12. Triple rinse the sample container with deionized water.
13. Transfer the filtered sample back into the sample container.
14. Preserve the sample with 2 ml 1/5 sulfuric acid or 0.2 ml concentrated sulfuric acid.

15. Place the preserved sample in the cooler on ice.
16. If additional samples require filtration, repeat Steps (3) through (15).

Field Sample Filtration Peristaltic Method

Peristaltic filtration method is used to collect dissolved nutrient(s), dissolved mineral(s) and dissolved metal(s). The dissolved nutrient and/or dissolved mineral and metal samples should be filtered and preserved immediately as each depth is sampled right in the boat.

1. Rinse a churn splitter three times with water from the sampling depth.
2. Place the entire contents of two Kemmerer grabs or two six-foot water column sampler volumes in to the triple rinsed churn splitter.
3. Assemble and attach pump head to power drive.
4. Plug in power drive.
5. Put on new latex or nitrile surgical gloves.
6. Remove acid rinsed tubing from plastic bag, taking care to prevent contamination and place in head draping the long end into the churn splitter and dangling the short end out of contact with boat or boat seats.
7. Turn on pump and begin rinsing tubing with a minimum of 250 ml of sample water from churn splitter.
8. As tubing rinses remove cartridge filter from plastic bag and insert cartridge while pump is still running to the tube's dangling end. Care should be taken to ensure filter cartridge is inserted in the correct direction.
9. Run 250 ml of sample water through cartridge filter.
10. Place labels on bottles.
12. Triple rinse the sample bottles and lids with sample water coming out of the filter cartridge.
13. Fill sample bottles.
14. Preserve nutrient sample with 2 ml 1/5 sulfuric acid or 0.2 ml concentrated sulfuric acid, and ICP Metals or Trace metals with 5 ml concentrated nitric acid lowering the pH to 2 or less.
15. Place samples in the cooler on ice.
16. If cartridge becomes plugged repeat Steps (6) through (15) with an in-line 2.0 um pre-filter placed in-line prior to 0.45 μm filter.



**North Dakota Department of Health
 Sample Identification Record
 Division of Laboratory Services—Chemistry
 Telephone: 701.328.6140
 Fax: 701.328.6280**

For Laboratory Use Only	
Lab ID:	
Preservation: Yes <input type="checkbox"/>	Temperature:
Initials:	

Surface Water Sample Identification Code R (Water samples)
 Samples received without this sheet or without all necessary sections fully completed will be rejected and not analyzed.

Sample Collection/Billing Information				
Account #	Project Code:	Project Description:		
Customer (Name, Address, Phone): SWQMP, Division of Water Quality, Gold Seal Center, 4 th Floor				
Date Collected:	Time Collected:	Matrix: Water	Site ID:	
Site Description:				
Alternate ID:		Collected By:		
County Number:	County Name:			
Comment:				
Comment:				

Field Information/Measurements					
Sample Collection Method (Circle One): Grab <input type="checkbox"/> DI* <input type="checkbox"/> DWI** <input type="checkbox"/> 0-2 meter column <input type="checkbox"/>		Depth:	Units:	Discharge:	Stage:
Conductivity:	pH:	Temp:	Dissolved O ₂	Turbidity:	
Comment:					

Analysis Requested			
<input type="checkbox"/> 5) SW-Major Cations/Anions	<input type="checkbox"/> 74) SW-PAHs	<input type="checkbox"/> 33120) SW-E. coli	
<input type="checkbox"/> 7) SW-Trace Metals	<input type="checkbox"/> 84) SW-PCBs	<input type="checkbox"/> SW-TOC	
<input type="checkbox"/> 21) SW-Carbamates	<input type="checkbox"/> 105) SW-Chlorophyll-a & b Filtered: _____ mL	Volume <input type="checkbox"/> SW-DOC	
<input type="checkbox"/> 23) SW-Acid Herbicides	<input type="checkbox"/> 118) SW-TSS	<input type="checkbox"/> SW-C-BOD-5day	
<input type="checkbox"/> 25) SW-Base/Neut. Pest	<input type="checkbox"/> 144) SW-Trace Metals-dissolved	Other:	
<input type="checkbox"/> 30) SW-Nutrients, Complete	<input type="checkbox"/> 160) SW-Nutrients, Complete-dis		
<input type="checkbox"/> 50) SW-Nutrients, Total P-dis.	<input type="checkbox"/> 33080) SW-Fecal coliform bacteria		

Figure 7.04.2 Sample Identification/Custody Record Form. * Depth Integrated ** Depth/Width Integrated

Project Code	Project Description
Sample ID	Site Description
Analysis: (DC Code) SW-Analyte Group	
Container:	Preservative:
Date: _/_/_	Time: :_ Depth:
Sampler	

Project Code	Project Description
389990	Field Bottle Blank
Analysis: (DC Code) SW-Analyte Group	
Container:	Preservative:
Date: _/_/_	Time: :_ Depth:
Sampler	

Project Code	Project Description
389999	Duplicate Sample
Analysis: (DC Code) SW-Analyte Group	
Container:	Preservative:
Date: _/_/_	Time: :_ Depth:
Sampler	

Figure 7.04.4
Label, Water Chemistry Blank Label, and Water Chemistry Duplicate Label.

SWQMP Water Chemistry