

7.08

**STANDARD OPERATING PROCEDURES  
FOR THE COLLECTION AND PRESERVATION  
OF STREAM AND RIVER GRAB SAMPLES  
FOR CHEMICAL AND BIOLOGICAL ANALYSIS**

**Summary**

Grab samples collected for chemical analysis should be representative of the entire stream or river. To be representative, samples must be carefully collected, properly preserved, and appropriately analyzed. In general, samples should be collected from the main current of the stream or river at 60% of the total stream depth.

In ideal conditions grab samples are only collected on low gradient and slow moving streams. The grab sample can be collected either by wading or by lowering a sampling device such as a Kemmerer sampler, Van Dorn sampler or weighted open bucket from a bridge crossing.

When collecting the sample by wading, enter the stream slightly down current from the appropriate sampling site, then wade to the area with the greatest current. Rinse each sample bottle and lid 3 times with stream water prior to collecting the sample. Place lid on sample bottle then submerge to approximately 60 percent of the stream depth, remove the lid and allow the bottle to fill facing towards the current. Replace the lid prior to removing bottle from stream. A small portion of the sample will need to be decanted off prior to preserving and/or placing in cooler. Note: In very shallow streams care must be taken not to contaminate the sample with bottom sediments.

When collecting from a bridge using a Kemmerer or Van Dorn sampler, lower the device into the stream and trip the sampler at 60 percent of the total stream depth. If using a weighted open mouthed bucket, allow the bucket to descend nearly the entire stream depth and then rapidly retrieve.

**Equipment and Supplies**

- 2.2. or 3.2 liter non-metallic sampler (e.g., Kemmerer or Van Dorn sampler), with rope marked at 0.5-meter depth intervals and a messenger.
- Sample containers (see Table 3.1, Standard Operation for Field Procedures)
- Acid for sample preservation (see Table 3.1, Standard Operation for Field Procedures)
- Sample labels.
- Clear Tape for sample containers
- Coolers with ice and/or frozen gel pack(s).
- 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).
  - Stainless steel 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).
  - In-line 0.45 µm cartridge filters (Geotech dispos-a-filter or equivalent).
  - In-line 0.50 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.
- Sample ID/Custody Record.
- Black ballpoint pen or mechanical pencil.
- Sample and blank log forms.
- Power ice auger (winter sampling).
- Ice skimmer (winter sampling).
- Sled (winter sampling).
- Stainless steel forceps.

## **Procedure**

### **Stream Sample Collection**

1. Place a label on each sample container and use clear tape to secure the label to the container (Figure 7.08.2).
2. Triple rinse each sample bottle using stream water. Note: Do not rinse the fecal coliform bacteria or the pesticide sample bottles.
3. Fill the sample bottle: Samples should be collected in the main current at that depth which is approximately 60 percent of the total water depth below the surface. When stream depth permits, a sample may be collected by wading the stream and inserting sample container facing against the current, allowing it to fill naturally at the appropriate depth. At greater water depths, an appropriate sampling device should be used. Note: Care should be taken so that the sample is not contaminated by disturbing the stream bed upstream from the collection point.
4. Preserve the sample containers appropriately, and place all samples in a cooler on ice.

5. Fill out the Sample ID/Custody Report (Figure 7.08.3) and the water chemistry sample log (Figure 7.08.1).

### **Stream Blank Sample Collection**

1. Field blank samples are collected with first and every tenth stream sample collected (i.e., 1, 10, 20.....). If the sample log indicates a blank sample should be collected, follow the steps below.
2. Place a label on each sample container (Figure 7.08.2) and fill out the sample information log form (Figure 7.08.1). Note: Field sample blanks should be identified with STORET number 389990.
3. Using deionized water, triple rinse each sample bottle.
4. Fill each bottle with deionized water.
5. Preserve each sample appropriately. Note: Do not preserve the total dissolved phosphorus sample.
6. Place the sample in a cooler on ice.

### **Stream Duplicate Sample Collection**

1. Duplicate samples are collected with the first and every following tenth stream sample collected (i.e., 1<sup>st</sup>, 10<sup>th</sup>, 20<sup>th</sup>.....). If the sample log indicates a duplicate sample should be collected, follow the steps below.
2. Place a label on each sample container (Figure 7.08.2) and fill out the Sample ID/Custody Report (Figure 7.08.3). Note: Duplicate samples should be identified with STORET number 389999. Be sure to indicate on the label the project name and type of sample being duplicated.
3. Collect the sample following steps (a) - (c) in the procedure for Stream Sample Collection.
4. Place the samples in a cooler on ice.

**Stream Sample Filtration**

1. Total dissolved phosphorus samples should be filtered immediately.
2. Put on new latex surgical gloves.
3. Remove filter holder from the plastic bag and assemble.
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 C.
9. Load a 0.45  $\mu\text{m}$  filter into the filter apparatus and connect the vacuum pump.
10. Repeat Step (5).
11. Filter the sample through the 0.45  $\mu\text{m}$  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 lowering the pH to 2 or less.
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**

1. Rinse churn splitter three (3) times with water from the stream or river.
2. Fill churn splitter with water from the appropriate stream depth.

3. Assemble and attach pump head to power drive.
4. Plug in power drive.
5. Put on new latex surgical gloves.
6. Remove acid rinsed tubing from plastic bag, taking care to prevent contamination and place in head draping a long end into the churn splitter and dangling the short end out of contact with anything.
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 to the tube's dangling end while pump is still running. 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.
11. Triple rinse the sample bottles and lids with sample water coming out of the filter cartridge.
12. Fill sample bottles.
13. Preserve nutrient sample with 2 ml 1/5 sulfuric acid or 0.2 ml concentrated sulfuric acid and ICP Metals or Trace metals with 2 ml concentrated nitric acid lowering the pH to 2 or less. Note: Dissolved minerals are not preserved.
14. Place samples in the cooler on ice.
15. If cartridge becomes plugged repeat Steps (6) through (15) with an in-line 2.0  $\mu\text{m}$  pre-filter placed in-line prior to the 0.45  $\mu\text{m}$  filter.



**North Dakota Department of Health  
Division of Water Quality  
Stream and River Field Log  
Telephone: 701.328.5210  
Fax: 701.328.5200**

Sample #:	Site ID:	Site Description:	Date: ___/___/___	Spec. Conduct	Temperature
Dup	Blk	Comments:	Time:       :	pH	D.O.
Sample #:	Site ID:	Site Description:	Date: ___/___/___	Spec. Conduct	Temperature
Dup	Blk	Comments:	Time:       :	pH	D.O.
Sample #:	Site ID:	Site Description:	Date: ___/___/___	Spec. Conduct	Temperature
Dup	Blk	Comments:	Time:       :	pH	D.O.
Sample #:	Site ID:	Site Description:	Date: ___/___/___	Spec. Conduct	Temperature
Dup	Blk	Comments:	Time:       :	pH	D.O.
Sample #:	Site ID:	Site Description:	Date: ___/___/___	Spec. Conduct	Temperature
Dup	Blk	Comments:	Time:       :	pH	D.O.
Sample #:	Site ID:	Site Description:	Date: ___/___/___	Spec. Conduct	Temperature
Dup	Blk	Comments:	Time:       :	pH	D.O.
Sample #:	Site ID:	Site Description:	Date: ___/___/___	Spec. Conduct	Temperature
Dup	Blk	Comments:	Time:       :	pH	D.O.

Figure 7.08.1 Stream and River Field log.

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

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

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

**Figure 7.08.2** SWQMP Water Chemistry Label, Water Chemistry Blank Label, and Water Chemistry Duplicate Label.



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

<b>For Laboratory Use Only</b>	
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.

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

<b>Field Information/Measurements</b>					
<b>Sample Collection Method (Circle One):</b> 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 <sub>2</sub>	Turbidity:	
Comment:					

<b>Analysis Requested</b>			
<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 Volume Filtered: _____ mL	<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 7.08.3** Sample Identification/Custody form. \* Depth Integrated \*\* Depth/Width Integrated