

7.13

## **STANDARD OPERATING PROCEDURES FOR THE COLLECTION AND PROCESSING OF WHOLE FISH TISSUE SAMPLES**

### **Summary**

Because fish spend their entire life in a particular water-body they can be important indicators of water quality, especially toxic pollutants. Toxic pollutants which may be present in the water column or the sediments at concentrations below our analytical detection limits may be exhibited in fish tissue analysis due to bio-accumulation.

In general, composite whole fish samples are analyzed for major organic contaminants (i.e., PCBs and pesticides) and trace metals including mercury. Table 7.13.2 contains a complete list of the parameters analyzed. The data generated is used to assess the impacts and the extent of toxic contamination in our lakes and streams. The data is also used in screening to determine which water-bodies require additional sampling for the possible issuance of fish consumption advisories.

In summary, a composite sample of similarly sized and like species of fish are collected and ground whole. The composite is mixed well and a 500 to 1000 ml sample is placed in a glass jar with teflon lid. The sample is labeled and immediately frozen to await chemical analysis.

### **Field Equipment and Supplies**

- Fish measuring board.
- Fish weigh scale.
- Plastic bags.
- Coolers with ice or frozen gel packs.
- Field data forms.
- Sample labels.
- Sample log forms.
- Hip boots or waders (if shocking, wear pvc coated chest waders).
- Rain coat.
- Rubber gloves.
- Pen.
- Fish collection gear (nets, electrofishing gear, etc.) if necessary.
- 5 gallon bucket.
- Generator (if electrofishing).

### **Laboratory Equipment and Supplies**

- Knife(s).
- Sharpening stone.
- Meat grinder (Fleetwood Model T 22 Chopper) with stainless steel feed pan, cylinder, worm gear, blades, and sieve plate.
- Stainless steel pan.
- Acetone (reagent grade).
- Soap.
- Sample containers (Qorpak, EPA Clean, 8-oz. glass jars with teflon-lined cap).
- Sample labels.
- Sample ID/Custody Report Forms
- Pen.
- Latex gloves.

### **Field Procedures**

1. For general survey purposes, a minimum of two composite samples are collected for analysis. One composite group should be represented by a large predator species (e.g., northern pike, walleye, largemouth bass) the other group should be represented by a bottom-feeding species (e.g., carp, white sucker, redhorse, catfish).
2. Fish will usually be collected in conjunction with the North Dakota Game and Fish Department's annual test netting operations. When collecting fish in conjunction with the Game and Fish, a special effort should be made to coordinate schedules so as to not jeopardize the quality of the fish collected for analysis. The following methods are commonly employed by the Game and Fish: trap netting, gill netting, and electrofishing. In general, any method of collection is acceptable providing the samples are fresh and in good condition.
3. Sort the fish collected by species and by size. Select five fish (three minimum) within each group for composite analysis. Each composite group should consist of fish of uniform size. As a guideline, the length of any one fish in the composite group should not exceed  $\pm 25$  percent of the average length of the entire composite group. The largest fish possible should be collected.
4. Fill out the fish tissue collection field data form (Figure 7.13.1), recording the species, sex (if possible to determine), length, and weight.
5. Place a sample label on the plastic bag containing the composite fish sample (Figure 7.13.3).
6. Place the samples in a cooler on ice! Note: Fish may be kept refrigerated or on ice for up to 48 hours after collection. They must not be frozen until they are processed in the laboratory.

### **Laboratory Procedures**

1. Prior to processing (grinding) the first sample and after processing each composite sample, wash the grinder assembly, collection pan, cutting board, and knives with hot tap water, rinse with acetone and allow to air dry.
2. Wear latex gloves when processing samples and change gloves between processing composite samples.
3. Cut up each fish into small pieces and pass through the grinder once.
4. Hand mix the composite sample until thoroughly homogenized, then pass through the grinder a second time.
5. Hand mix the sample a second time then fill a sample container with the sample (one pint of sample is equivalent to approximately 500 grams).
6. Label the sample container appropriately and fill out the Sample ID/Custody Report (7.13.2).
7. If the sample log form indicates a split sample be collected, fill a second sample container and label appropriately (Figure 7.13.3). Note: Fish tissue split samples should be identified with STORET number 389995.
8. Place the sample containers in the freezer prior to submitting the samples to the laboratory.
9. If another composite sample requires processing, repeat steps (1) through (7).



**North Dakota Department of Health**  
**Division of Water Quality**  
**Fish Collection Field Log**  
**Telephone: 701.328.5210**  
**Fax: 701.328.5200**

**Lab ID Number:** \_\_\_\_\_ **Project Code:** \_\_\_\_\_

**Project Description:** \_\_\_\_\_

**STORET No.:** \_\_\_\_\_ **Waterbody Name:** \_\_\_\_\_

**Location Description:** \_\_\_\_\_

**Date/Time Collected:** \_\_\_\_\_ **Date/Time Processed:** \_\_\_\_\_

**Sampler(s):** \_\_\_\_\_

**Collection Method:** \_\_\_\_\_

**Species:** \_\_\_\_\_ **Tissue Type:** \_\_\_\_\_

**Comments:** \_\_\_\_\_

Log #	Species Init.	Comp. Size	Sex(m/f/unk.)	Length(cm)	Min	Max	Avg	Mass(g)	Min	Max	Avg
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Figure 7.13.1 Fish tissue collection field data form.



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

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

<b>Sample Collection/Billing Information</b>			
Account #	Project Code:	Project Description:	
Customer (Name, Address, Phone):			
Date Collected:	Time Collected:	Matrix: Tissue	Site ID:
Site Description:			
Alternate ID:		Collected By:	
County Number:	County Name:		
Comment:			
Comment:			

<b>Field Information/Measurements</b>			
Species Name:	Species Code:	Tissue Type:	Sample Size:
Comment:		Min. Length (cm):	Max. Length (cm):
		Min. Weight (g):	Max. Weight (g):
		Ave. Length (cm):	Ave. Weight (g):

<b>Analysis Requested</b>			
■ 76) Mercury			
■ 77) Base/Neut. Pest			
■ 78) Trace Metals			
■ 106) Acid Herbicides			
■ 107) PCBs			
■ 112) Urons			
■ 113) Carbamates			
■ 143) PAHs			

Figure 7.13.2 Fish sample custody form.

<b>Sample ID</b>	<b>Project Code</b>	<b>Project Description</b>
<b>Analysis: (DC Code) SW-Analyte Group</b>		
<b>Fish Species</b>	<b>Composite Size</b>	
	<b>Type of sample</b>	<b>Composite Weight</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>389995</b>		
<b>Analysis: (DC Code) SW-Analyte Group</b>		
<b>Fish Species</b>	<b>Composite Size</b>	
	<b>Type of Sample</b>	<b>Composite Weight</b>
	<b>Container:</b>	<b>Preservative:</b>
<b>Date: _ / _ / _</b>	<b>Time: :_</b>	<b>Depth: __</b>
<b>Sampler</b>	_____	

**Figure 7.13.3** Fish flesh label, and fish flesh split label.