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# United States Department of the Interior

U.S. GEOLOGICAL SURVEY

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Denver, Colorado 80225

## NATIONAL WATER QUALITY LABORATORY TECHNICAL MEMORANDUM 1993.08

May 26, 1993

To: Assistant Chief Hydrologist, PC&TS  
Regional Hydrologists  
Chief, Office of Water Quality  
Assistant Chief, Office of Water Quality  
Deputy ACH for PC&TS for NAWQA  
Area Hydrologists  
District Chiefs  
Regional Water-Quality Specialists  
Assistant Regional Hydrologists for NAWQA  
District Water-Quality Specialists  
Chiefs, NAWQA Study-Units  
Chief, Ocala Project Office  
Chief, Yucca Mtn. QA Group  
Chief, Branch of Quality Assurance  
Employees, National Water Quality Laboratory

Subject: New Inorganic Tissue Method

Author: Merle W. Shockey, Inorganic Program Chief (303) 467-8101

Revision: No

### Scope

The Methods Research and Development Program recently completed development work on a method for analysis of trace metals in tissue. The method was tested and approved on an interim basis for the following tissues: fish liver, corbicula, bovine liver, oyster tissue, and peach leaves. The fish liver and corbicula homogenates were prepared at the NWQL, while the bovine liver, oyster tissue and peach leaves standard reference materials were obtained from the National Institute of Standards and Technology. The method was developed for the NAWQA Program Occurrence and Distribution Phase of sampling but can be utilized by other District projects. A number of questions concerning the method have surfaced over the last few months. The purpose of this tech memo is to clarify those questions and let WRD employees know how to request and use this method.

## Trace Metal Tissue Method Details

The method involves a nitric acid digestion procedure similar to EPA Method 200.3. The sample preparation procedure includes determining tissue wet weight and dry weight and requires approximately 10 days to complete. Acid-digested samples are analyzed for trace metals using inductively coupled plasma atomic emission (ICP-AES), inductively coupled plasma mass spectrometry (ICP-MS), and cold vapor atomic absorption (CV-AA). Five tissue types have been investigated: fish liver, bovine liver, corbicula, peach leaves, and oyster tissue.

The trace metals determined on these tissues are listed below according to analytical technique:

ICP-AES	ICP-MS	Cold-Vapor AA
Aluminum	Antimony	Mercury
Barium	Arsenic	
Boron	Beryllium	
Chromium	Cadmium	
Copper	Cobalt	
Iron	Lead	
Manganese	Molybdenum	
Strontium	Nickel	
Zinc	Selenium	
	Silver	
	Uranium	
	Vanadium	

It is preferred that no more than 40 grams of tissue (wet weight) be submitted, although we can, on a custom basis, handle larger amounts of material. If analysis of trace metals on other types of tissue (e.g., whole fish, insects, crayfish) is required, they are being handled on a custom basis. In order to have different tissue types analyzed, they must be cleared with the Inorganic Program Chief prior to being sent to the NWQL. The extra effort required to analyze and quality control these tissue types may require longer turnaround times and possibly extra costs.

### Capacity for Approved Types of Tissue Samples

At the present time, we have the capacity to digest 25 samples per week. In July 1993, we will increase our digestion capacity to approximately 200 samples per month. If analytical needs exceed 150 samples per month, we can increase capacity to 250-300 samples per month by purchasing another hood and adding another technician.

The NWQL requests anyone wishing to submit samples of approved types of tissue for analysis contact Tom White (303) 467-8152 or Merle Shockey (303) 467-8101. At that time, you can determine the tissue sample backlog and how long it will take to get your data returned. If there is a significant increase in requests for tissue analysis, we will increase our sample capacity.

## **Other Tissue Types**

Because there have been a number of requests for tissue types other than the ones for which the method has interim approval, we will attempt to analyze these on a custom basis as capacity allows. Contact Merle W. Shockley (303) 467-8101 to set up custom handling of the samples. Costs may have to be adjusted and turnaround times may be lengthened.

/signed/

Peter F. Rogerson

Supersedes: None

Key Words: Tissue, Fish, Bovine, Liver, Corbicula, Peach Leaves, Oyster, ICP-AES, ICP-MS, Cold-Vapor AA

Distribution: See above plus QWTALK