

National Human Exposure Assessment Survey (NHEXAS)

Region 5 Study

Quality Systems and Implementation Plan for Human Exposure Assessment

Research Triangle Institute
Research Triangle Park, NC 27079

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Field Operations Protocol

RTI/ACS-AP-209-002

Title: Procedure for Collection, Storage, and Shipment of Flush and Drinking Water or Drinking Water Samples for Metals and Arsenic by EPA Method 200.8

Source: Research Triangle Institute

U.S. Environmental Protection Agency
Office of Research and Development
Human Exposure & Atmospheric Sciences Division
Human Exposure Research Branch

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TITLE: PROCEDURE FOR COLLECTION, STORAGE, AND SHIPMENT OF FLUSH AND DRINKING WATER OR DRINKING WATER SAMPLES FOR METALS AND ARSENIC BY EPA METHOD 200.8

SOURCE: Research Triangle Institute
Post Office Box 12194
Analytical and Chemical Sciences
Research Triangle Park, NC 27709-2194

AUTHOR(s):

_____ *Heidi W. Thomas* _____ Date: 4/8/96

_____ Date: _____
_____ Date: _____

APPROVED BY:

Principal Investigator: *E. Pellegrini* _____ Date: 4/23/96
QA Officer: *DJ Smith* _____ Date: 4/21/96

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PROCEDURE FOR COLLECTION, STORAGE, AND SHIPMENT OF FLUSH AND
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1.0 SCOPE AND APPLICATION

The procedures described in this protocol are designed only to guide the collection, storage, and shipping of flush and drinking water samples to be analyzed by EPA Method 200.8 (version 4.4) during Phase I of the National Human Exposure Assessment Survey (NHEXAS). Flush water samples are defined as tap water that is collected after water flows through the tap for a specified period of time. Drinking water samples are also to be collected from the primary source of drinking water for the study participants when the primary source is different from tap water and when dietary samples are not collected. The samples will be collected for total recoverable elements. The NHEXAS primary target analytes are lead and arsenic (Table 1). The secondary analytes are cadmium and chromium. This protocol describes the sample containers, sample collection, preservation, storage, shipping, and custody procedures.

2.0 SUMMARY OF THE METHOD

Sample containers will be prepared and shipped to the field site. The primary source of drinking water for each household will be identified. **If the primary source of drinking water is other than tap water and if dietary samples are not collected, then two additional samples will be collected from the primary drinking water source.** The samples will be chilled at 1E to 6EC from the time of collection through the shipment to the analytical laboratory. All samples will be shipped to the analytical laboratory within seven days of collection. Completed custody records will be submitted with each sample. Nitric acid will be added to each sample upon receipt at the analytical laboratory.

Method Reference

EPA Method 200.8, Revision 4.4, April 1991, U.S. EPA, Methods for the Determination of Metals in Environmental Samples, Office of Research and Development, Washington, D.C. (EPA/600/4-91/010).

3.0 SAMPLE COLLECTION MATERIALS

- 3.1 250 mL high density polyethylene bottles (Scientific Specialties Service, Inc. 233008, or equivalent).
- 3.2 Portable pH meter with resolution of 0.2 pH units or better.
- 3.4 Cooler
- 3.5 Ice packs (Cole Palmer L-06346-70 or equivalent)

4.0 PREPARATION OF MATERIALS

4.1 Bottles

- 4.1.1 Precleaning will be by the supplier under EPA protocol C (detergent wash, rinse with reagent grade water, Rinse with 1:1 nitric acid, rinse with reagent grade water, air-dried).
- 4.1.2 Alternatively, the bottles will be washed according to ACS/SOP-150-001, "Standard Cleaning Procedure for Cleaning Glassware/Plasticware" except tap water rinses will not be used; all rinses will be with deionized water only. Additionally, the bottles should not be oven dried.

5.0 SAMPLE COLLECTION

- 5.1 Have the participant identify their primary drinking water source at home.

5.2 Collection of a Flush Tap Water Sample

- 5.2.1* Collect one sample from the kitchen tap using the procedures described below.
- 5.2.2 Do not remove any aerators, disconnect any filters present at the tap or bypass any water softening systems.
- 5.2.3 Run the water at a moderate flow for at least three minutes.
- 5.2.4 Reduce the flow rate so that bubbles will not be created in the bottle while collecting the sample.

NOTE: Steps 5.2.2 through 5.2.3 can be eliminated if they have already been completed for another water sample at the home immediately prior to collection of these samples; the water flow should not be turned off between samples.

5.2.5* Fill the sample bottle with at least 200 mL of water; do not pre-rinse. Do not fill the bottle completely full.

5.2.6 Seal each sample bottle.

5.2.7 Enter the sample collection information (see Figure 1) into the sample collection record.

5.3 With water still running from the tap, fill a small plastic container with tap water for a pH measurement. Use the portable pH meter to measure the pH immediately after filling the container. Enter the pH reading into the sample collection record.

5.4 Collection of Drinking Water Other than from a Tap

5.4.1 If in step 5.1 the participant indicated his or her primary drinking water was not tap water and dietary samples are not being collected for this participant, then collect two additional samples from the primary drinking water source.

5.4.2* Dispense at least 200 mL of drinking water directly into the sample bottle. Do not pre-rinse. Do not fill the bottle completely full.

5.4.3 Seal each sample bottle.

5.4.4 Enter the sample collection information (see Figure 1) into the sample collection record.

6.0 SAMPLE STORAGE AND SHIPMENT

6.1 Immediately after collection store the sample in the dark at 1E to 6EC.

6.2 The sample must be kept in the dark at 1E to 6EC at all times until analysis.

6.3 Prior to shipment, wrap electrical tape around the bottle cap so that it does not loosen during shipment.

6.4 Ship the sample to the analytical laboratory within seven days of collection.

6.5 Ship the sample in an insulated shipping container with sufficient cold packs so that the sample will remain cold for 24 hours.

NOTE: The sample must already be at 6EC or less when it is packed for shipment.

6.6 The sample will be shipped by an overnight carrier to the analysis lab.

6.7 Fax or mail a copy of the shipping summary sheet to EPA-Cincinnati.

7.0 QC PROCEDURES

7.1 Sample Code

7.1.1 A unique sample code must be assigned to each sample.

7.1.2 The sample container must have a label with a sample code identical to the code on the sample collection record. The sample label must be secured by winding clear tape over the label and completely around the bottle.

7.2 Chain of Custody

7.2.1 Complete the sample collection information in the sample collection record when the sample is collected. The information needed on the sample collection record is presented in Figure 1.

7.2.2 Enter the collector ID and date collected in the appropriate fields in the collection record.

7.2.3 Print the custody record prior to shipping the sample and enclose the original custody record with the sample as it is shipped.

7.3 Quality Control Samples

7.3.1 Field Blanks

7.3.1.1 Field blanks are prepared to assess sample contamination from materials and methods.

7.3.1.2 Field blanks are prepared for a small percentage of the study homes to be defined in the QSIP.

7.3.1.3 Field blanks are prepared in the laboratory by adding contaminant-free water to a sample collection container.

7.3.1.4 Field blanks are shipped to the field site then taken to a participant's home and treated as a sample through storage and shipment to the analysis laboratory.

7.3.2 Collocated Sample Collection

7.3.2.1 Collocated samples are collected to assess collection and analysis precision.

7.3.2.2 Collocated samples are collected in a small percentage of homes, with the percentage to be defined in the QSIP.

7.3.2.3 Collocated samples are collected, stored and shipped following the same procedures as samples.

7.3.3 Field Controls

7.3.3.1 Field controls are prepared to assess recovery of target analytes through storage, shipment, and analysis.

7.3.3.2 Field controls are prepared for a small percentage of the study homes, to be defined by the quality assurance officer.

7.3.3.3 Field controls are prepared by adding a known amount of the target analytes to contaminant free water in a sample collection container.

7.3.3.4 Field controls are shipped to the field site, then taken to a participant's home and treated as a sample through storage and shipment to the analysis laboratory.

SAMPLE TYPE:	Flush or drinking
SAMPLE CODE:	Same as label on container
PARTICIPANT ID:	Three digit participant i.d. number
COLLECTION DATE:	Date sample collected
COLLECTION TIME:	Time sample collected
COLLECTOR ID:	ID number of person that collected
COLLECTION LOCATION:	Default = kitchen tap; revise for other location/source
pH:	Record pH level of the water
PRESERVATIVE ADDED (FIELD):	Default = none
CHLORINE QUENCHER ADDED:	Default = none
COMMENT CODE:	Default = 0; change to 1 or 2 if a comment is added below
COMMENT:	Add text for any comments associated with this particular sample.

Figure 1. Information to be included on the sample collection record.

TABLE 1. TARGET ANALYTES FOR NHEXAS PHASE I
WATER COLLECTION METHOD 200.8

Primary	Secondary	Others of Interest
Lead	Cadmium	Aluminum
Arsenic	Chromium	Barium
		Manganese
		Selenium
		Nickel

EXPLANATION OF REVISIONS

Revisions Made 4/96; Denoted by*

General:

In the original protocol, separate samples were collected for Pb, Cd, Cr and for As. EPA decided that arsenic would be included in the analysis for the other target analytes. The protocol was revised to eliminate collection of a second sample. Revisions were made in the title, Sections 2.0, 5.2.1, 5.2.5, 5.4.2, and Figure 1.