National Human Exposure Assessment Survey (NHEXAS)

Maryland Study

Quality Systems and Implementation Plan for Human Exposure Assessment

Emory University
Atlanta, GA 30322

Cooperative Agreement CR 822038

Standard Operating Procedure **NHX/SOP-L15**

Title: Preparation of Food and Beverages by Homogenization

Source: Harvard University/Johns Hopkins University

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

Notice: *The U.S. Environmental Protection Agency (EPA), through its Office of Research and Development (ORD), partially funded and collaborated in the research described here. This protocol is part of the Quality Systems Implementation Plan (QSIP) that was reviewed by the EPA and approved for use in this demonstration/scoping study. Mention of trade names or commercial products does not constitute endorsement or recommendation by EPA for use.*

1. Title of Standard Operating Procedure

   Harvard University/Johns Hopkins University Standard Operating Procedures:
   L15 Preparation of Food and Beverages by Homogenization, Rev. 1.0

2. Overview and Purpose

   This SOP is a modification of FDA SOP NHEXAS-I "Sample Preparation in NHEXAS Food or Beverage Composites by Homogenization" and Kent Thomas's memo "NHEXAS dietary sample processing and distribution issues for the RTI/EOHSI consortium."

3. Discussion

   This procedure is applicable to duplicate and mini-market-basket food and beverages. It describes the preparation, shipping, and storage operations that will be carried out at the FDA Laboratory in Kansas City before the fractions are sent to contract laboratories for analysis.

4. Personnel Responsibilities

   It is the responsibility of the analyst(s), the supervisory chemist, and the laboratory director to comply with all criteria described in this procedure.

5. Required Equipment

   Note: Aluminum foil and paper towels are not to be used in the sample preparation room to avoid possible sources of contamination.

   5.1 Equipment -- Reusable

   computer with bar code reader and software
   commercial sprayer for washing equipment
   blender, quart glass jar: Waring model # 33AM26
   blender, gallon stainless steel jar: Waring model # 34BL22
   food processor, 6 quart: robot coupe model R6N
   food processor, 10 quart: robot coupe model R10
   bowls, spoons, knives, other utensils: stainless steel
   high speed processor: Polytron power controller, Kinematica model PCU-1, Brinkman Instruments, Westbury, NY 11590, or equivalent
   Polytron generator, titanium probe, Brinkman model PT 10/35 or equivalent
   walk-in refrigerator/freezer, Penn Refrigeration Service Corp., Wilkes-Barre, PA
   Moisture/Solids Analyzer, model AVC-80 CEM Corporation, Matthews, NC 28106
   analytical balance, Mettler PS-15, Hightstown, NJ

5.2 Equipment - Consumable

lab cloths for drying equipment
centrifuge tubes, 50-mL, disposable, Cole Parmer Inst. Co. Cat. No. M-06334-30 or equivalent
clear glass bottles, 4 oz., Qorpak, 2 dozen per box, Fisher Scientific Co. Cat. No. 033207C or equivalent
clear, colorless glass pint Mason jars with 2-piece screw caps (Note: lids are put on jars with the rubber seal side up; the rubber seal does not come into contact with the jar's contents.)

6. Procedure

6.1 Preparation of Samples at Field Coordination Center

At the Field Coordination Center (FCC), staff will inspect duplicate food samples, remove inedible materials (bones, pits, etc.), and transfer solid food from individual plastic bags to large plastic jars. Beverages will remain in the 2-L plastic jars in which they are collected. See HSPH SOP F08 "Collection, Storage, and Shipment of Duplicate Diet Samples for Metal, Pesticide, and PAH Analysis."

FCC staff will also purchase mini-market-basket samples, remove inedible materials, measure correct amounts, and place solid foods and beverages in separate plastic jars. Samples will not be cooked. See HSPH SOPs F09 "Mini-Market Basket Questionnaire Training and Data Collection" and F10 "Mini-Market Basket Analysis and Food Purchasing."

Each container will have a label showing the sample ID number in both bar code and human-readable form. Solids and beverages from the same household or stratum will have different ID numbers. The solids and beverages from each household or stratum will be a 4-day composite and are expected to total about 10 kg.

Samples will be mailed from the Field Coordination Center (FCC) to the FDA by Federal Express overnight delivery. See HSPH SOP G05 "Storage and Shipping of Samples." Each package will include cold packs, an inventory list, Chain-of-Custody forms, and logsheets.

6.2 Receipt of Samples at FDA

When samples are received at FDA, the person receiving them will:

- Inspect and file the Fedex form or airbill.
- Scan the ID labels with the bar code reader, print out a list, and compare it with the inventory list.
- Sign the Chain-of-Custody form for each sample, make a copy to file, and place the original [where? with samples?]
- Store the samples in the appropriate refrigerator.

6.3 Equipment Cleaning

Before preparation of the first sample and after preparation of each subsequent sample, the analyst will:

- Wash all equipment (blenders, choppers, food processors, utensils, etc.) with hot water using the commercial sprayer.
- Rinse the equipment with deionized water and dry thoroughly with a clean cloth purchased especially for this operation.

6.4 Preparation of Beverages

- Check the ID labels on the beverage jars to be sure that all are identical.
- Pour the beverages into the blender. Blend until homogeneous.
- Distribute the mixture into containers as shown in the table below.

Table 1 --Distribution of Food and Beverages

Destination	Analysis	Number	Size (each)	Container
FDA-DC	Pb, Cd	2 [??]	50 mL [??]	plastic centrifuge tube [??]
FDA-DC	Cr	2 [??]	5 mL [??]	[??]
FDA-DC	As	2 [??]	5 mL [??]	[??]
[??]	pesticides	3 [??]	125 mL	glass jar
[??]	PAHs	2	125 mL	glass jar
EPA	archival	2	50 mL	plastic jar
EPA	archival	3	50 mL	glass jar

6.5 Preparation of Solid Foods

- Check the ID labels on the food jars to be sure that all are identical.
- Transfer the food into the blender.
  Blend until homogeneous.
- Distribute the mixture into containers as shown in the table above.

6.6 Moisture Determination

- Take 2-3 grams of the solid food composite and determine the moisture content, using a CEM AVC-80 Moisture Analyzer. The Moisture Content Analysis Report will be included in the shipment of samples. See FDA SOP KCX-2 "Moisture Determination."

6.7 Storage and Shipping of Samples

- Storage after processing: [???]
- Holding times before & after processing: [???]
- Shipping conditions, destinations, schedule: [???]

7. Quality Assurance Procedures

Semiannually, prepare a sample preparation quality assurance sample. The sample will be representative of the composites prepared. Blend commutate until homogeneous. Remove a 500-gram sample and note the sample as "Time 0." Continue blending the item for 3, 6, 9, and 12 minutes. Collect a sample from each time interval. Label as appropriate. Repeat the above procedure using the blenders and polytron. Forward a portion of the samples to each sample analysis location.

8. References

Harvard University/Johns Hopkins University Standard Operating Procedures:
G05 Storage and Shipping of Samples
F08 Collection, Storage, and Shipment of Duplicate Diet Samples for Metal, Pesticide, and PAH Analysis
F09 Mini-Market Basket Questionnaire Training and Data Collection
F10 Mini-Market Basket Analysis and Food Purchasing

Thomas, Kent: memo "NHEXAS dietary sample processing and distribution issues for the RTI/EOHSI consortium." (July 22, 1994)

U.S. Food and Drug Administration SOPs:
NHEXAS-I, Standard Operating Procedure for Sample Preparation in NHEXAS Food or Beverage Composites by Homogenization (Dec. 30, 1994)
KCX-2 Moisture Determination [date unknown; we do not have a copy of this.]