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-F01**

Title: Field Sampling--General Information

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.*

1.0 Title of Standard Operating Procedure
F01 Field Sampling--General Information, Rev. 1.0

2.0 Table of Contents

3.0 Sampling Plan
This table summarizes the samples that will be taken.
Separate boxes indicate separate samples.
One box for PAHs and pesticides indicates that one sample will be taken to be analyzed for both.

Medium	**Metals**	**Pesticides**	**PAHs**
Air, indoor	Black box pump 4 LPM, HI 10 μm, 24 h	Black box pump 4 LPM, URG PUF sampler, 24 h	
Air, outdoor	SKC personal sampling pump 4 LPM, HI 10 μm, 24 h	(none)	
Air, personal	Personal sampling pump, 4 LPM, 10 μm, 24 h	(none)	(none)
Water	Drinking water, flushed (2 min) if tap water	Drinking water, flushed (2 min) if tap water	
Dust	Vacuum sample of activity room floor -- to be divided for analysis for metals, PAHs, pesticides		
Soil	Yard, foundation, garden samples -- to be composited; composited sample to be divided for analysis for metals, PAHs, pesticides		
Dermal wipe	Both hands, day 1	Both hands, day 8	(none)
Food	Duplicate plate and mini-market basket -- each to be divided for analysis for metals, PAHs, pesticides		
Urine	First daily void, day 2 & day 8 -- each to be analyzed for metals, pesticides, and creatinine (solids)		(none)
Blood	Venous puncture, 46 cc (6 tubes) -- to be analyzed for metals, pesticides, PAHs, VOCs		

4.0 Staff Responsibilities

4.1 Field Staff Responsibilities
This table summarizes what each field staff person will do on each day of sampling. Note that different staff people will visit the household on different days.

Visit & Day	Interviewer	Field Technician 1	Field Technician 2	Phlebotomist
Visit 1: Day 1	Introduction (Cycle 1): Informed consent form Incentive payment plan Questionnaire: Baseline Instruction: Activity diary Food checklist Duplicate diet Urine samples Personal air sampler Samples: Water Dermal wipe - metals Complete logsheets and chain-of-custody forms	Setup for sampling: Indoor air - metals Indoor air - PAHs & pesticides Outdoor air - metals Personal air sampler Complete logsheets and chain-of-custody forms	Plans: House Yard Foundation Samples: Dust Soil Questionnaire: Technician Complete logsheets and chain-of-custody forms	
Visit 2: Day 2				Samples: Blood Pickup: Personal air sampler Urine sample 1 Complete logsheets and chain-of-custody forms
Visit 3: Day 8	Questionnaire: Followup Diary examination: Activity diary Food checklist Pickup: Duplicate diet Urine sample 2 Sample: Dermal wipe - pesticides Complete logsheets and chain-of-custody forms	Takedown: Indoor air - metals Indoor air - PAHs & pesticides Outdoor air - metals Transfer to FCC: Samplers Equipment Complete logsheets and chain-of-custody forms		

4.2 FCC Staff Responsibilities

Position	Field Coordinator	Field Supervisor	Telephone Interviewer	FCC Clerk	FCC Supervisor	Resource Specialists	Communication Specialist
Name	Bob Clickner	Rotraut Bockstahler			Brian Dingwall & assistant(s)	Rick Rinehart, Jill Weiner, R. Bockstahler	Jill Weiner
Before Cycle (esp. before Cycle 1)		Assign field staff to homes	Call prospective respondents, administer Baseline Q, arrange appointments	Make sure enough labels, forms, etc. are in stock.	Air: check pumps, program timers. Dust: assemble & calibrate HVS3s.		Develop & implement procedures for recruiting & retaining respondents, and other public info & outreach. Supervise phone interviewers.
Preparation for Sampling	Air: Inspect & package filters (or FCC Tech & assistant do ?), keep custody of PUF samplers.		Reminder calls	Print ID labels, affix to paperwork, assemble Field Packet for household.	Air: assemble samplers, check pumps, program timers. Dust: maintain HVS3s, label catch bottles. Water: check pH meters, label bottles.	Supervise preparation for sampling.	Supervise phone interviewers.
During Sampling			Reminder calls			Answer questions from field staff.	Supervise phone interviewers.
After Sampling	Receive custody of samples. Scan ID labels of samples as they are packed for shipping, approve list.			Copy & file paperwork, assemble labels etc. for shipping.	Air: disassemble HIs & PEMs, package filters, package PUF samplers, check & clean equipment. Dust: check filter bags, decontaminate nozzles & tubing.	Supervise preparation of samples for shipping.	Supervise phone interviewers.

5.0 Field Sampling Schedule

This is an approximate schedule of what each person does during field sampling. Times will vary depending on the respondents, sampling conditions, experience of field staff, etc. Some tasks may be performed in a different order, but Field Technician 1 should set up the outdoor sampler first so that Field Technician 2 can sample dust in the activity room first. Each vertical box equals 10 minutes; m = minutes; Q = questionnaire.

Visit 1 (Day 1):

Time (m)	Interviewer	Field Technician 1	Field Technician 2
0-10	Cycle 1: consent form, incentive plan. Introduce staff to respondent. Ask about rooms, yard, etc.	Be introduced. Look for good places for air samplers.	Be introduced. Look for good places for dust sampling.
10-20	Begin Baseline Q (40 m).	Set up outdoor air sampler (40 m).	Begin floor plan (25 m).
20-30	Continue Baseline Q.	Continue outdoor air.	Continue floor plan.
30-40	Continue Baseline Q.	Continue outdoor air.	Finish floor plan.
40-50	Continue Baseline Q.	Finish outdoor air.	Begin dust (30 m) in activity room.
50-60 (1 hour)	Activity diary instructions (5 m). Urine sample (5 m).	Start indoor air (40 m).	Continue dust.
60-70	Duplicate food instructions, set up refrigerator (15 m).	Continue indoor air.	Finish dust; pack tools.
70-80	Instructions: Food checklist (5 m).	Continue indoor air.	Technician Q (8 m).
80-90	Dermal wipe (8 m). Technician Q (floor cleaning) (3 m).	Finish indoor air.	Begin soil, including yard and foundation plans (40 m).
90-100	Water (5 m). Begin personal air instruction (15 m).	Prepare personal air sampler (5 m) Begin assisting with personal air instruction (15 m).	Continue soil.
100-110	Finish personal air.	Finish personal air.	Continue soil.
110-120 (2 hours)	Thank respondent, remind him/her of days 2 & 8 appointments.	Complete forms. Pack tools.	Finish soil. Complete forms. Pack tools.

(5.0 Field Sampling Schedule, continued)

Visit 2 (Day 2) is phlebotomist only:

Time (minutes)	Phlebotomist
0-10	Take blood samples
10-20	Pick up urine sample
20-30	Collect personal air sampler; take flow reading

Visit 3 (Day 8):

Time (minutes)	Interviewer	Field Technician 1
0-10	Greetings, description of what we will do today. Check activity diary (5 m)	Begin taking down outdoor air samplers (25 m).
10-20	Begin followup Q (20 m).	Continue outdoor air.
20-30	Finish followup Q.	Finish outdoor air.
30-40	Dermal wipe (8 m). Collect duplicate food, count containers, etc. (7 m).	Begin taking down indoor air samplers (25 m).
40-50	Check food checklist (5 m).	Continue indoor air.
50-60 (1 hour)	Food diary followup Q (10 m).	Finish indoor air.
60-70	Collect urine sample (5 m). Thank respondent, etc.	Pack equipment.

6.0 Analysis Responsibilities

Medium	Division etc.	Metals	Pesticides	PAHs	
				Extraction	**Analysis**
Air - indoor	(none)	Emory	SwRI	SwRI	SwRI
Air - outdoor	(none)	Emory	(none)	(none)	(none)
Air - personal	(none)	Emory	(none)	(none)	(none)
Water	(none)	EPA sub-contractor TE	EPA sub-contractor AT	EPA sub-contractor AT	EPA sub-contractor AT
Dust	SwRI	Emory	SwRI	SwRI	SwRI & [???]
Soil	SwRI	Emory	SwRI	SwRI	SwRI & [???]
Dermal wipe	(none)	Emory	SwRI	(none)	(none)
Food	Westat	FDA	FDA	(none)	(none)
Urine	(none)	CDC	CDC	CDC	(none)
Blood	(none)	CDC	CDC	CDC	CDC

Dust and soil samples will be sieved and divided at SwRI and a portion sent to Emory for metals analysis.

Food samples will be inspected, decanted into aggregate containers, and weighed by field personnel at Westat, then sent to FDA for analysis.

Water samples will be analyzed by EPA sub-contract laboratories: Trans Enviro (metals), Aqua Tech Environmental Laboratories (organics).

CDC	Centers for Disease Control (Atlanta)
Emory	Emory University, School of Public Health (Atlanta)
EPA NHEERL	EPA National Health and Environmental Effects Research Laboratory (Research Triangle Park, NC) (formerly OHR-HERL)
FDA	Food and Drug Administration (Kansas City)
HSPH	Harvard School of Public Health (Boston)
SwRI	Southwest Research Institute (San Antonio)
Westat	Westat - tasks to be done at Field Coordination Center (Rockville, MD)

7.0 Equipment and Supplies for Field Sampling

These tables show the equipment needed for one day's sampling (2 residences for all staff except phlebotomist). It does not have specifics (e.g., type of gloves) for space reasons; these are in the SOP for the appropriate medium. This list includes only items needed in the field, not at the FCC.

7.1 Interviewer

All homes -- one set of equipment that will go to every home	Each home -- for 2 homes we will have 2 identical sets, each consisting of:	
	In tote box (with partitions: big section for paper etc., smaller ones for sampling equipment)	Not in tote box
Hand truck, bungee cords, straps (for refrigerator etc.)	Cycle 1: consent form & incentive plan Field Packet for household: questionnaires, logsheets, chain-of-custody forms, diaries, checklists, instruction sheets (all with correct ID labels) ID labels, spare Clipboard Pens, ballpoint -- blue or black Dermal wipe: towelettes disposable gloves dressing sponges stainless steel tray stainless steel forceps isopropanol in dispenser bottle wipes hand lotion sample glass sample jar Water: 2 1-L bottles pH probe small cup dropper bottle of acid parafilm or electrical tape Urine 2 cups, in labeled bags trash bag	Day 1: Refrigerator Food containers and cold packs (in refrigerator unless respondent doesn't want refrigerator, then in carton) Cooler: to hold water bottles, dermal wipe Day 8: Cooler (with cold packs) to hold food if respondent didn't want fridge [dermal wipe samples can go in FT1's cooler with dry ice]

7.2 Field Technician 1

All Homes -- one set of equipment that will go to each home	Each home -- for 2 homes we will have 2 identical sets, each consisting of:		
In tool box	In tote box	In sampler case (small tote box with padding and dividers)	Not in tote box
Field manual (SOPs) tool belt tools: screwdrivers (slotted & Phillips) pliers wrench (adjustable) hammer wire cutter scissors knife or razor blade plastic ties markers ruler rotameter (4 LPM) HI flow adapter for measuring flow adapter cap for PEM to measure flow spare parts for PEM and pumps PEM tool fuses rubber tubing spare extension cord tape: yellow CAUTION tape, laboratory tape, wide plastic tape, duct tape, label tape clamps and connectors wristwatch temperature/RH meter gloves: disposable (extra), cotton work gloves plastic bags (extra) wipes	ID labels: for logsheets, chain-of-custody forms, sample containers, spare Field Packet for household: logsheets, chain-of-custody forms clipboard pens gloves, disposable plastic bags trash bag Day 1: foam to insulate window if running cord out window floor mat 2 boards to raise black box rain hat for outdoor HI sampler 3 extension cords 2 plug adapters	Day 1: 3 HI samplers 2 PUF samplers 2 personal samplers	Day 1: 2 black box pumps SKC pump tripod (outdoor) tripod (indoor) bars to attach samplers to tripods rain cover for black box Day 8: cooler with dry ice

7.3 Field Technician 2

All Homes -- one set of equipment that will go to each home	Each home --for 2 homes we will have 2 identical sets, each consisting of:	
In tote box 1	In tote box 2	Not in tote box
tool belt screwdriver tape measures wipes gloves, disposable tape: clear plastic tape, plastic electrical tape, laboratory tape markers wristwatch skewers spare collection jar for soil HVS3 sampler Magnahelic gauges extension cord 3-prong outlet adaptor alcohol plastic sheeting or tray spare filter bag template masking tape HVS3 Manual	ID labels: for logsheets, chain-of-custody form, sample containers, spare Field Packet for household: logsheets, chain-of-custody forms plan forms: house, yard, foundation clipboard pens, ballpoint (black or blue always; also red or green in Cycles 2-8 for plans) Dust: tubes & nozzle for HVS3 sampler Teflon catch bottles plastic bags Soil: syringe collection jar trash bag	cooler (with cold packs) to hold dust & soil samples

7.4 Phlebotomist

<table>
<tr><td>All Homes -- one set of equipment that will go to every home</td><td colspan="2">Each home -- phlebotomist will visit several homes in a day, so will have several identical sets, each consisting of:</td></tr>
<tr><td>In bag</td><td>In tote box</td><td>Not in tote box</td></tr>
<tr><td>Field Manual
(SOPs relevant to phlebotomist)
rotameter
spare adapter for PEM</td><td>ID labels: for logsheets, chain-of-custody form, sample containers, spare
Field Packet for household: logsheets, chain-of-custody forms
clipboard
pens, ballpoint

for blood sampling:
disposable gloves
gauze sponges
alcohol wipe
adhesive bandage, Band-Aid or equivalent
tubes: 3 mL (1), 7 mL (1), 10 mL (2)
butterfly assemblies, 21g and 23g
Vacutainer multiple sample needles
10 cc plastic syringe for children
tourniquet
Vacutainer holder and adapters for pediatric tubes
wipes
first aid kit

for personal air:
bag to carry PEM setup

trash bag</td><td>cooler & cold packs for urine and blood samples</td></tr>
</table>

8.0 Field Packets

8.1 Contents

This table shows the papers needed for each visit to a residence. A note "from day 1" indicates that a form that was started on a previous day is needed again. "New" indicates that a new sample will be collected, so a new form is needed. "p/p" = pesticides & PAHs.

Visit and Day	**Field Staff Person**	**Medium**	**Papers Needed in Field Packet for Household**		
			Logsheets	**Chain-of-Custody Forms**	**Other Papers**
Visit 1: Day 1	Inter-viewer	Question-naires	---	form for each questionnaire	Baseline Activity diary Food checklist
		Instruction sheets	---	---	Duplicate diet Personal sampler Urine sample
		Duplicate diet	Duplicate diet	---	---
		Water	Water	new	Cycle 1: mark well (if any) on yard plan form
		Dermal wipe	Dermal wipe: ID for metals	new	---
	Tech-nician 1	Outdoor air	Outdoor air: metals	metals (filter)	Cycle 1: mark sampler location on house plan form
		Indoor air	Indoor air: ID labels for metals & pesticides/PAHs	metals (filter) p/p (PUF sampler)	Cycle 1: mark sampler location on yard plan form
		Personal air	Personal air	personal air (filter)	---
	Tech-nician 2	Dust	Dust (field)	dust (bottle)	house plan form (new in Cycle 1, copy in 2-8)
		Soil	Soil (field)	new	foundation & yard plan forms (new in Cycle 1, copy in 2-8)

(continued on next page)

8.1 Field Packet Contents (continued)

Visit and Day	Field Staff Person	Medium	Papers Needed in Field Packet for Household		
			Logsheets	**Chain-of-Custody Forms**	**Other Papers**
Visit 2: Day 2	Phlebot-omist	Blood	Blood: 7 ID labels	7 for 7 tubes	
		Urine	Urine: day 2	new	
		Personal air	Personal air (from day 1)	Personal air (from day 1)	
Visit 3: Day 8	Inter-viewer	Question-naires	---	Followup questionnaire	Followup questionnaire
		Duplicate diet	Duplicate diet (from day 1)	new	---
		Urine	Urine: day 8	new	---
		Dermal wipe	Dermal wipe: ID for pesticides (new)	new	---
	Tech-nician 1	Outdoor air	Outdoor air: metals (from day 1)	metals (filter) (from day 1)	---
		Indoor air	Indoor air: ID labels for metals & pesticides/PAHs (from day 1)	metals (filter) p/p (PUF sampler) (from day 1)	---

8.2 Procedures

The field packet for each household, including the Visit Form, will be prepared by the FCC Clerk and checked by field staff before field staff go to the home. The Visit Form will be prepared using confidential information from the Field Coordinator's confidential files.

The field packet for each household and Cycle will be kept in a file folder labeled, for example, "Household 123, Cycle 1." The folder for the current Cycle will contain the Visit Form until the last visit to the household for the Cycle. After the last visit of the Cycle, the Visit Form will be moved to the FC's confidential file. Except for the Visit Form, which will be in the regular file for one week per Cycle, folders in the regular files will contain forms identified only by the ID number. A "history" for each household, identified by ID number and indicating dates of visits and names of staff members, will be kept in the folder for the current or next Cycle.

After each visit, chain-of-custody forms will be checked, completed, and copied. The original and copy will be shipped and stored according to SOP G04 "Chain-of-Custody and Sample Tracking." The top page of the three-part logsheet will go to the data entry location, the second page will go to the PI, and the third will be filed at the FCC.

9.0 Visit Form -- NHEXAS Phase I Study (to be prepared by FCC Clerk)

Cycle		**Cycle: _____**	**Cycles participated in by this household, including this Cycle: _____**	
Visit	**1**	**Date**	**Day of Week**	**Time**
	2	**Date**	**Day of Week**	**Time**
	3	**Date**	**Day of Week**	**Time**
Staff		**Interviewer**		
		Field Technician 1		
		Field Technician 2		
		Phlebotomist		
Respondent (confidential information)		**Contact Person**		
		Target Individual		
		Address		
		Telephone Number		
		Notes	**[ ] directions or map attached** **[ ] has moved since previous visit**	
Sampling Notes		**[ ] No place for outdoor air sampling. Do not bring outdoor air sampling equipment.**		
		[ ] No yard, foundation, or garden. Do not bring soil sampling equipment.		
		[ ] No permission for soil sampling. Do not bring soil sampling equipment.		
		[ ] Respondent will use household refrigerator. **Visit 1: Do not bring study refrigerator.** **Visit 3: Bring cooler.**		
Form prepared by		**FCC staff member**		
		Date		

10.0 Respondent Contact other than Visits 1, 2, 3 (to be done by Telephone Interviewers)

Note: Visit 1 = Day 1; Visit 2 = Day 2; Visit 3 = Day 8.

Timing	Action	Content	SOP and page
Before Visit 1 of Cycle 1, as soon as household is chosen	Call	Ask respondent whether s/he owns the property. If not, ask who does (name, address, telephone number)	F05 (Soil) p. 5
	Call & Letter	Ask owner of property for permission to take soil samples. Follow with letter.	F05 (Soil) p. 5
10 days before Visit 1	Letter	Ask respondent not to vacuum floors for at least 2 days before Visit 1.	F04 (Dust) p. 3
when scheduling Visit 1	Call	Ask target individual not to wash hands for 2 hours before Visit 1.	F06 (Dermal Wipe) p. 2
		Ask whether respondents want a small refrigerator to keep duplicate food.	F08 (Duplicate Diet) p. 3
day 5 or 6	Call	Confirm visit on day 8. Ask how many beverage containers and solid food bags have been used and whether more are needed. Ask whether target individual has any questions about saving duplicate food. Ask if duplicates of all foods and beverages have been saved, and if not, which ones and why not.	F08 (Duplicate Diet) p. 5
		Remind target individual to take urine sample, morning of day 8.	F11 (Urine) p. 3

11.0 Interviewer Questions (not on questionnaires) (all to be asked on Day 1)

Indoors:

1. Which room is the activity room? (where the most household activity takes place; this is usually the room with the television)
   a. How old is the flooring in this room?
   b. Where is the main footpath or play area?

2. Do household members remove shoes before entering the home:
   a. always
   b. never
   c. in wet weather
   d. other (explain)

Outdoors:

3. Where do the children play?
   If the target individual is an adult and plays any sport, where does s/he play?

4. Where do people gather, for example, in back yard in lawn chairs or near a barbecue?

5. Are there any areas where food is grown to be eaten by members of the household?
   If so, where? Include fruit trees.

6. If the household uses water from a well for drinking or cooking, how long have you been using water from this well?
   a. less than two months
   b. two months to one year
   c. more than one year
   (Note: If this is Cycle 1 or the household has been using water from the well for less than two months, the location of the well needs to be recorded. Ask the location of the well, and ask Field Technician 2 to mark the location on the yard plan.)

7. If the household has a septic tank, where is it?
   (Note: If this is Cycle 1, ask Field Technician 2 to mark the location on the yard plan.)

8. Where do you buy groceries?

Store Name or Chain	Location	% of Groceries
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____