

The Children's Total Exposure to Persistent Pesticides and Other Persistent Organic Pollutants (CTEPP) Study

Collection of Fixed Site Indoor and Outdoor Air Samples for Persistent Organic Air Pollutants

Battelle

Columbus, OH 43201
Contract No. 68-D-99-011

Standard Operating Procedure

CTEPP-SOP-2.12

Title: Collection of Fixed Site Indoor and Outdoor Air Samples for Persistent Organic Air Pollutants

Source: Battelle

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

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STANDARD OPERATING PROCEDURE (SOP)
FOR THE COLLECTION OF FIXED SITE
INDOOR AND OUTDOOR AIR SAMPLES
FOR PERSISTENT ORGANIC POLLUTANTS

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1.0 Scope and Applicability

This standard operating procedure (SOP) describes the methods for collecting fixed site indoor and outdoor air samples for the analysis of persistent organic pollutants (POP). This is suitable for the collection of POP present in the vapor phase and condensed on particles <10 μ m.

2.0 Summary of Method

- 2.1 This procedure gives the steps that must be followed to set up, calibrate, initiate, and terminate air sampling for POP.
- 2.2 Indoor and outdoor air is sampled simultaneously during a 48-hour period.

3.0 Definition

- 3.1 URG-2000 sampler: The sampler that is used to collect the POP. The sampler consists of a Delrin cap with inlet hole and 10 μ m cut-point impactor plate, Teflon O-ring, stainless steel filter holder screen, Delrin sleeve/ filter holder, and glass sorbent tube with 1/4" exit tube.

4.0 Cautions

- 4.1 Field personnel should take care that all electrical connections are secure and protected from moisture, especially at outdoor sampling locations.
- 4.2 All loose cables (power cords) should be properly secured (e.g., covered by sand or taped on the floor).
- 4.3 Before using masking tape, test it on a small area and make sure it will not damage the surface of the participant's property. Use masking tape for the indoor floor cover and duct tape for outdoor (concrete) ground cover.

5.0 Responsibilities

- 5.1 The filters and XAD-2 resin will be purchased and cleaned by Battelle Columbus staff. The procedures for cleaning filter/XAD-2 cartridges are documented in CTEPP-SOP-5.10. The cleaned filter/XAD-2 cartridges will be shipped to Battelle Durham off ice for North Carolina (NC) field sampling and kept at Battelle Columbus Laboratory in Ohio (OH) for OH field sampling.
- 5.2 Field teams will be responsible for the set up, calibration, and operation of indoor and outdoor air samplers in the field. The field teams will be responsible for implementing the appropriate QA/QC action plans for field blanks. The field teams will also be responsible for removing the samplers from sampled locations, and for packaging the filter/XAD-2 cartridges for transfer to Battelle Columbus Laboratory.
- 5.3 The field teams will be responsible for generating the Chain-of-Custody form for each sample, and for shipping these with the samples to Battelle Columbus Laboratory.

6.0 Apparatus and Materials

- 6.1 Materials
 - 6.1.1 Pre-cleaned filter/XAD-2 cartridges
 - 6.1.2 Teflon tape
 - 6.1.3 Small Kim-Wipes (4" x 4")
 - 6.1.4 Disposable gloves
 - 6.1.5 URG-2000 samplers
 - 6.1.6 Thomas pumps and SKC pumps
 - 6.1.7 Flow meter equipped with adaptor fittings
 - 6.1.8 ¼" Tygon tubing in 3-ft lengths
 - 6.1.9 Bubble wrap
 - 6.1.10 Dry ice

6.1.11 Aluminum foil.

6.1.12 Styrofoam sampling box equipped with a cooling fan (2)

6.1.13 Playpen

6.1.14 Plastic doghouse

6.1.15 Stroller net

6.1.16 Power strip with extension cord

6.1.17 Ring stand with weather hat

6.1.18 Duct tape and Masking tape

6.2 Reagents
None.

7.0 Procedures

7.1 Procedure to Assemble Sampler for POP Collection

7.1.1 The field technician identifies the location where the indoor and outdoor samplers will be placed. Place the playpen at the indoor location and the doghouse at the outdoor location. Run an extension cord to the playpen and the doghouse to provide power to the sampling equipment.

7.1.2 Place a Styrofoam sampling box both in the playpen and the doghouse. Each Styrofoam box should contain either two Thomas (outdoors usage) or two SKC pumps (indoor usage), power strip, and cooling fan. Make sure that the sampling pump and the cooling fan are plugged into the power strip. Run an extension cord from the nearest electrical outlet to the playpen and doghouse. Take care that the electrical connections are secure and that they are protected from any moisture, especially outdoors. Plug the extension cord into the power strip. Make sure that the 1/4" Tygon tubing connected to the sample pump inlet extends through the hole in the top of the Styrofoam box.

- 7.1.3 The field technician puts on a pair of disposable gloves and removes one clean filter/XAD-2 by unwrapping the bubble wrap but not the aluminum foil. Keep the bubble wrap for use after air sampling.
- 7.1.4 Record the pre-labeled cartridge number on a sample tracking sheet and remove the aluminum foil from the cartridge. Try not to tear the aluminum foil since it will be used to rewrap the cartridge after sampling. Remove both end caps of the cartridge and save the end caps along with the aluminum foil in a plastic bag.
- 7.1.5 Connect the cartridge outlet to the ¼" Tygon tubing that is attached to the inlet of the sampling pump. The height of inlet port is about the breathing zone of the child subject. For indoor samples, slide the cartridge into the pre-drilled hole in the top of the Styrofoam box. For the outdoor samples, mount the cartridge vertically outside the door to the doghouse using a ring stand. The ring stand should have a weather hat that is mounted above the cartridge to keep rain and snow off the cartridge inlet.
- 7.2 Calibration
 - 7.2.1 Start the sampling pump by turning on the ON/OFF switch on the power strip in the Styrofoam box. Record the time as the start time on the sampling tracking sheet.
 - 7.2.2 Connect a flow meter to the cartridge inlet using a special ½ in. I.D to ¼ in. I.D. adapter.
 - 7.2.3 Check the flow rate through the cartridge with the flow meter. The flow rate should be in the 3.9-4.1 L/min range. If the flow rate is outside this range, adjust the by-pass valve on the sampling pump to bring it back into the proper range.
 - 7.2.4 Once the flow rate is set in the proper range, let the pump run for two minutes. Record the flow measurement and sample identification on the sample tracking sheet.
- 7.3 Procedure to Initiate Sampling
 - 7.3.1 Remove the flow meter from the cartridge inlet.
 - 7.3.2 For indoor samples, place the stroller net over the top of the playpen to protect it from curious children. For outdoor samples, place the roof on the doghouse to protect the equipment from bad weather conditions.
- 7.4 Procedure to Terminate Sampling

- 7.4.1 After 48 hours of sampling, the field technician will reconnect the flow meter to the inlet of the cartridge. The flow measurement will be recorded on the sample tracking sheet.
- 7.4.2 Turn off the sample pump at the ON/OFF switch on the power strip. Record the sample end time on the sample tracking sheet.
- 7.4.3 Place the end caps on the cartridge and seal both end caps with Teflon tape.
- 7.4.4 Wrap the cartridge in aluminum foil followed by bubble wrap. Use the aluminum foil and bubble wrap that were taken off the cartridge prior to sampling. Store the cartridge in a cooler packed with blue ice or a refrigerator until shipping to Battelle Columbus laboratory for analysis.
- 7.4.5 Ship in the cooler to Battelle Columbus Laboratory by FedEx. If the sampling household is within one-day driving distance to Columbus Ohio, the cooler is brought back with field staff. The samples are removed from the cooler and stored in the freezer in the laboratory.

8.0 Records

All records will be kept in a bound laboratory record book. Field air monitoring data will be recorded in the Field Notebooks. All paper documents will be kept in the project folders. Electronic files will be stored in the sampling folders and archived on a CD ROM after the project is completed. Subject identification files will be stored in a secured file cabinet. All electronic files will be protected by passwords. Only authorized project personnel will be allowed to access the files. All records and files will be archived in a secure room for three years after the completion of the study.

9.0 Quality Control and Quality Assurance

A log of the Thomas pump and SKC pump flow rates will be maintained with each pump (recorded in the Field Notebooks). If deviations are found between starting and final flow rates, the pump must be returned to Battelle Columbus Laboratory for service and/or repair. The Field Notebooks will be reviewed and verified by the Field QA Officer, the Field Team Leader, and the Task Order Leader through internal field audits and quality control audits.

10.0 Reference

- 10.1 J. C. Chuang, C. Lyu, Y-L Chou, P. J. Callahan, M. Nishioka, K. Andrews, M. A. Pollard, L. Brackney, C. Hines, D. B. Davis, and R. Menton, "Evaluation and Application of Methods for Estimating Children's Exposure to Persistent Organic Pollutants in Multiple Media." EPA/600/R-98/164a (Volume I), 1999.