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

Collection of Floor Dust Samples for Persistent Organic Pollutants

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

Standard Operating Procedure **CTEPP-SOP-2.19**

Title: Collection of Floor Dust Samples for Persistent Organic Pollutants

Source: Battelle

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

STANDARD OPERATING PROCEDURE (SOP) FOR THE COLLECTION OF FLOOR DUST SAMPLES FOR PERSISTENT ORGANIC POLLUTANTS

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1.0 Scope and Applicability

This standard operating procedure (SOP) describes the method for collecting a floor (carpet) dust sample from the room that the child uses most to measure for persistent organic pollutants (POP).

2.0 Summary of Method

Carpet dust samples will be collected in the room that the child uses most at home and/or at day care using a High Volume Small Surface Sampler (HVS3) vacuum sampler (Cascade Stack Sampling Systems, Bend, OR). In addition, participants will also be asked to donate a used vacuum cleaner bag of floor dust collected during the month previous to sampling.

The HVS3 is a high-powered vacuum cleaner that consists of a sampling nozzle that can be adjusted to a specific static pressure within the nozzle, a cyclone to separate particles 5 µm mean diameter and larger at a flow rate of 20 cfm (9.5 L/s), and a Teflon bottle to collect the sample. The HVS3 is designed to provide efficient and reproducible capture of dust and associated semi-volatile organic compounds (SVOC) from carpet surfaces. Roberts and co-workers[1-3] have found that the HVS3 collects house dust and associated pesticides embedded in new carpets with an efficiency of 36-46 percent. For older carpets, the collection efficiency averages 69 percent of the mass of dust present in the carpet.

3.0 Definitions

3.1 Persistent Organic Pollutants: semi-volatile organic chemicals (SVOC) and non-volatile organic chemicals (NVOC).

3.2 High Volume Small Surface Sampler (HVS3): a high powered vacuum cleaner used to collect house dust samples from carpets and bare floors.

4.0 Cautions

4.1 Field staff will make sure that all electrical connections are secure and protected from moisture.

4.2 Field staff will wear Latex gloves when cleaning the HVS3 with isopropanol.

5.0 Responsibilities

5.1 Field teams will be responsible for pre-testing, calibrating, and operating the HVS3 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 packaging the dust sample jars for transfer to Battelle Columbus Laboratory.

5.2 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 in Ohio.

6.0 Apparatus and Materials

6.1 Materials

6.1.1 High-Volume Small Surface Sampler (HVS3)

6.1.2 Large (15" x 15") lint-free laboratory tissue (example: Kimwipes, available from Kimberly-Clarke Corp., Roswell, GA 30076)

6.1.3 Teflon bottle

6.1.4 Glass sample jar

6.1.5 Latex gloves

6.2 Reagents

6.2.1 Isopropanol (reagent grade)

7.0 Procedures

7.1 Pretest cleaning

7.1.1 Prior to sampling carpet dust, disassemble and clean the HVS3 by swabbing the internal tubing, the plastic wheels, and the nozzle lip with a clean laboratory tissue wetted with isopropanol. Then dry all parts with fresh laboratory tissues, before the unit is reassembled. Next attach a clean Teflon catch bottle to the HVS3.

7.2 Floor dust collection for carpet

7.2.1 At the sampling location, choose an area of the carpet that is generally in the main traffic path through the carpet and at least 1 m from any outside door.

7.2.2 Mark out a 76 x 100 cm (30 in. x 39 in.) rectangle with masking tape, and subdivide the width into ten 7.6 cm wide segments (see Figure 1).

7.2.3 Position the sampler in the lower left corner of the sampling grid (see Figure 1). Begin sampling by moving the HVS3 across the 100 cm length of the first grid a total of eight times back and forth along the 7.6-cm wide segment (four times forward and four times back). Move the sampler at about 0.6 m/s (~2 ft/s). After the eighth pass, gradually angle the unit over to the next segment, and repeat the procedure until all ten segments have been sampled, for a total sample area of 0.76 m^2.

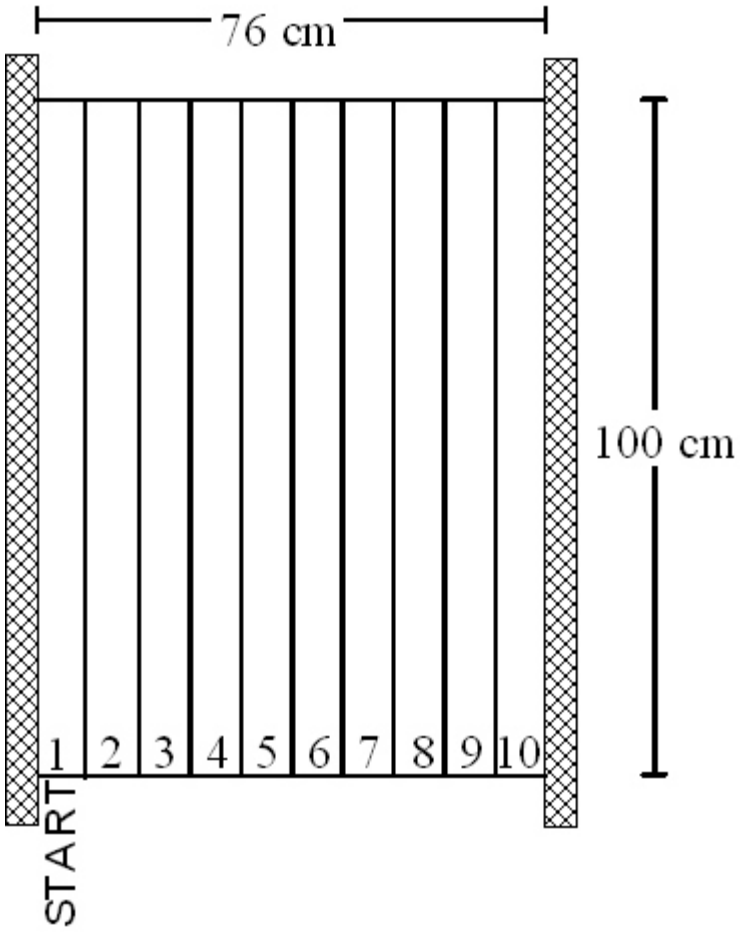
Because the amount of dust collected from carpets varies widely, it may be necessary to use more than one sampling area to obtain the required amount of sample. After sampling the first 0.76 m^2 area, check the amount of dust in the Teflon catch bottle. If the bottle is not at least ½ inch full with floor dust, continue sampling additional 0.76 m^2 areas until the bottle is filled with this required amount of floor dust (exception: if it takes too much time and the participant asks you to leave, stop sampling immediately). Record the total number of 0.76 m^2 test areas that are sampled in the Field Notebook, as well as the location of each test area on a sketch of the room being sampled.

7.2.4 After the required amount of carpet dust is collected, transfer the dust from the Teflon catch bottle into a clean pre-labeled glass jar. After the lid of the glass jar is screwed on, seal it with Teflon tape.

7.2.5 Store the glass jar in a cooler with blue ice until it is returned to the laboratory. At the laboratory, store the jar in a freezer.

7.2.6 Ship the jar by cooler with dry ice to Battelle Columbus Laboratory by FedEx.

Figure 1. Carpet Sampling Grid



8.0 Records

8.1 The sampling location will be recorded in the Field Notebook.

8.2 A Chain-of-Custody Record will be used to document the sample collection and shipping.

9.0 Quality Control and Quality Assurance

9.1 Maintenance logbooks will be kept on the HVS3. The HVS3 operational manual[10.4] will be followed for maintenance and parts information.

10.0 References

10.1 J. W. Roberts, W. T. Budd, M. G. Ruby, A. E. Bond, R. G. Lewis, R. W. Weiner, and D. E. Camann, "Development and Field Testing of a High Volume Sampler for Pesticides and Toxics in Dust," *J. Exposure Anal. Environ. Epidemiol.,* **1**, 143-155 (1991).

10.2 W. T. Budd, V. R. Stamper, J. W. Roberts, and M. G. Ruby, "Equivalency Testing of HVS2 and HVS3 Samplers," Draft Final Report, U.S. Environmental Protection Agency, Contract No. 60-02-4544, WA III-75, 1991.

10.3 ASTM Designation:D 5438-94 -- Standard Practice for Collection of Floor Dust for Chemical Analysis.

10.4 "High Volume Small Surface Sampler HVS3: Operation Manual," Cascade Stack Sampling Systems (CS_3), Inc., Bend, Oregon, January 13, 1992.

10.5 J. C. Chuang, P. J. Callahan, R. G. Menton, S. M. Gordon, R. G. Lewis, and N. K. Wilson, "Monitoring Methods for Polycyclic Aromatic Hydrocarbons and their Distribution in House Dust and Track-In Soil." *Environ. Sci. Technol.,* **29**, 494-500 (1995).