

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

Collection of Dermal Wipe Samples for Persistent Organic Pollutants

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

Standard Operating Procedure

CTEPP-SOP-2.15

Title: Collection of Dermal Wipe 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

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.*

STANDARD OPERATING PROCEDURE (SOP)
FOR THE COLLECTION OF DERMAL WIPE
SAMPLES FOR PERSISTENT ORGANIC POLLUTANTS

Prepared by: _____	Date: _____
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1.0 Scope and Applicability

This standard operating procedure (SOP) describes the method for collecting a dermal wipe sample from a subject's hands in order to measure persistent organic pollutants (POP) on the skin.

2.0 Summary of Method

Hand wipe samples will be collected before a participant washes his/her hands, just before lunch and supper on each of two days. The field staff will measure the hand wipe surface area by tracing the subject's hands and will record the information on the data form. This method provides for collection of surface POP residue from the subject's hands. The wipes (gauze pads) will be pre-cleaned, wetted with 75% isopropanol in distilled water, and stored in clean glass jars before field use.

The adult participant will wipe the hand he/she uses most often first, including the back, front, and sides of the hand, fingers, and thumb. Then, he/she will fold the gauze pad in half and repeat the procedure on the other hand with the same gauze pad. The wipe sample will be placed in a clean jar for shipment. The adult subject will put on latex gloves, then use the same procedure to wipe the hands of his/her child with a clean wipe.

3.0 Definition

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

4.0 Cautions

- 4.1 Field staff will keep the jars containing the gauze pads out of reach of children.

5.0 Responsibilities

- 5.1 The wipe materials will be purchased by Battelle Columbus Laboratory. The pre-cleaning of these wipes and packaging for field use will be performed at Battelle Columbus Laboratory in Ohio (OH). The cleaned wipes will be placed in clean jars and shipped to Battelle Durham Office for the North Carolina (NC) part of the field study. For the OH part of the field study, wipes will be kept at Battelle Columbus Laboratory. The sampling and return shipping will be handled by field team members. Subsequent extractions, sample preparation, and analyses will be performed at Battelle Columbus Laboratory.

6.0 Apparatus and Materials

6.1 Materials

- 6.1.1 Teflon-lined screw-cap vials (5 mL)
- 6.1.2 SOF-WICK gauze pads (4" x 4" -6 ply; Johnson & Johnson)
- 6.1.3 2 oz. glass jars
- 6.1.4 Disposable latex gloves
- 6.1.5 Soxhlet extractor (large size, e.g. Kontes 585000-0023; including extractor body, condenser, 300 mL round bottom flask)
- 6.1.6 Heating mantle
- 6.1.7 Variac
- 6.1.8 Boiling chips (Hengar crystals)
- 6.1.9 Stainless steel tongs
- 6.1.10 Teflon or stainless steel tweezers
- 6.1.11 Glass vials (5 mL) with Teflon-lined screw caps
- 6.1.12 Small cooler
- 6.1.13 Blue ice (ice packs)
- 6.1.14 Instruction sheets (Attachments I and II)

6.2 Reagents

- 6.2.1 Acetone (distill-in-glass or equivalent)
- 6.2.2 Isopropanol (distill-in-glass or equivalent)

7.0 Procedures

7.1 Pre-extraction of the Wipes

7.1.1 Cut each of the wipe (4" x 4" -6 ply) into two wipes (4" x 4" -3 ply). Load eight wipes into a Soxhlet extractor. Load eight wipes into a Soxhlet extractor. Add 250 mL of dichloromethane (DCM) to the 300 mL round bottom flask; add a few boiling chips. Connect the condenser. Add the heating mantle and the Variac. A batch of up to 64 clean wipes (eight Soxhlet set ups) can be prepared. Alternatively, load 24 wipes in a larger size Soxhlet extractor; add 800 mL of DCM to the 1 L round bottom flask for cleaning.

7.1.2 Continue with Soxhlet extraction overnight for at least 12 hr.

7.1.3 At the end of extraction, drain residual DCM from the Soxhlet extractor and remove wipes to a clean stainless drying canister. Dry the extracted wipes with nitrogen under vacuum at 60°C.

7.1.4 Allow the wipes to dry for approximately 4 hr.

7.1.5 Aliquot 2 mL of 75% isopropanol in distilled water onto the entire surface of one clean dried wipe and fold the wipe in half and place in a clean jar.

7.1.6 Repeat step 7.1.5 until all wipes are wetted with the solvent and placed in clean jars. Pack the jars and send them to the field.

7.2 Field Hand Wipe Procedure

The number of hand wipe samples to be collected is illustrated in the following table.

Subject	Hand Wipe Sample Per Participant	Remarks
Day Care Sample Component		
Parent/at Home	2	1 per day for 2 days
Child/at Home	2	1 per day for 2 days
Child/Day Care	2	1 per day for 2 days
Telephone Sample Component		
Parent/at Home	4	2 per day for 2 days
Child/at Home	4	2 per day for 2 days

- 7.2.1 The hand wipe samples will be collected before lunch and supper and before the subject takes a bath or washes his/her hands.
- 7.2.2 The adult participant removes one gauze pad from the jar, and opens the wipe to a 4" x 4" square.
- 7.2.3 The adult holds the pad and, with moderately firm pressure, wipes his/her dominant hand, including the back, front, and sides of the hand, fingers, and thumb.
- 7.2.4 The adult then folds the pad inside out along the 4" length, with the exposed (contacted) surface now on the inside. The wipe is now a 2" x 4" rectangle.
- 7.2.5 With the 2" x 4" rectangle, the adult wipes the same areas of his/her other hand.
- 7.2.6 The adult then folds the pad in half again with the exposed (contacted) surface now on the inside. The pad is now its original 2"x 2" size.
- 7.2.7 The adult then puts the pad back into the glass jar and writes the date and time the sample was collected on the label of the jar.
- 7.2.8 The adult participant will put on a clean pair of latex gloves, and wipe the child's hands using another clean wipe following the steps detailed in 7.2.2 to 7.2.7
- 7.2.8 Store the samples in a refrigerator (or in a cooler provided by the field team) until the field staff pick up the wipe samples on Day-3. The field staff will trace both hands of the child and adult subjects and record them on the field data sheet.
- 7.2.9 Store the samples at $\leq 4^{\circ}\text{C}$ until shipment by FedEx to Battelle Columbus Laboratory for analysis.

8.0 Records

- 8.1 Chain-of-Custody Records will be used to document the wipe sample collection and shipping.
- 8.2 A record of the participant's ID, child, age, gender, date, time, and any problems encountered in the sampling will be noted.
- 8.3 A record of the blank levels of target compounds in each batch of cleaned wipes will be maintained in the Laboratory Record book. The book will record the batch number, the date of extraction, the lot number for the wipes, and the lot number of the solvent used for

extraction and spiking. The book will be retained in the respective extraction laboratories until the conclusion of the study, and will serve as a continuing file on the expected performance of the cleanup step. At the conclusion of the study, the book will be archived in a secure room for three years.

9.0 Quality Control and Quality Assurance

- 9.1 Field staff will examine the hand wipe sample at the sampling site and ask the participants about any potential problems during the sample collection. [**Note:** Field staff should not open the sample jar and touch the hand wipe sample.]
- 9.2 For each batch of the wipes cleaned, a blank wipe will be analyzed to determine the background levels of the target compounds.
- 9.3 One field blank will be prepared for each batch of the cleaned wipes. The wipe will be placed in the jar and labeled as a field blank. Store and ship as per instructions for actual samples.

10.0 References

- 10.1 R. A. Fenske and C. Lu, "Determination of Handwash Removal Efficiency: Incomplete Removal of the Pesticide Chlorpyrifos from Skin by Standard Handwash Techniques." J Am Ind Hyg Assoc, 55, 1994.
- 10.2 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.

ATTACHMENT I

CTEPP -- Children's Environmental Study Instructions for Collecting

Hand Wipe Samples

Day Care Center

SOP 2.15

1. **When to collect:** The samples should be collected on the day specified in the Child Activity Diary. Allow some time for the child to do his/her regular activities at the day care center. Take the hand wipe sample **before the child washes his/her hands and prepares for lunch.**
2. **How to do it:**
 1. Put on a clean pair of latex gloves, remove the wipe from the jar, and open the wipe to a 4" x 4" square.
 2. Hold the wipe (Figure 1) and, with moderately firm pressure, wipe the child's hand (the hand the child uses the most first) including the back, front, and sides of the hand, fingers, and thumb **one time** (Figure 2). Follow the arrows in the diagram, wiping both sides of the hand from bottom to top.
 3. Fold the wipe inside out, turning the contacted surface to the inside (2" x 4").
 4. Repeat step 2 to wipe the child's other hand.
 5. Fold the wipe into its original size (2" x 2") with the contacted surfaces now on the inside and put it back in its jar.
 6. Write the date and time the hand wipe sample was collected on the label of the jar.
 7. Discard the used gloves.
 8. Store the samples in a refrigerator (or in the cooler provided by us).

If you have any questions about the hand wipe sample collection, please call Christopher Lyu, Field Team Leader, at 1-877-810-9530, ext. 506 (this is a free call). Thank you very much for your assistance.

Figure 1.

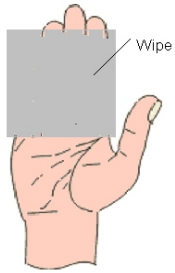
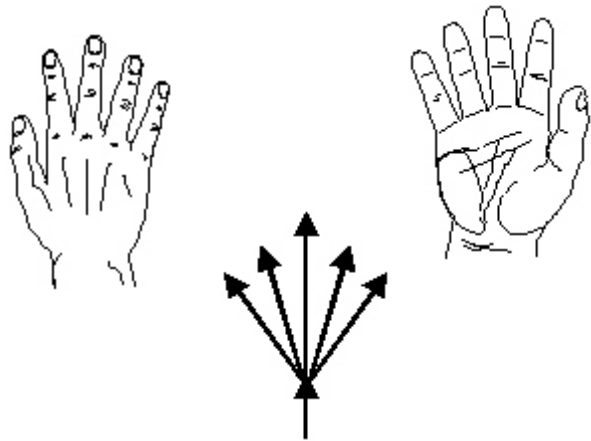


Figure 2.



ATTACHMENT II

CTEPP -- Children's Environmental Study Instructions for Collecting

Hand Wipe Samples

Household

SOP 2.15

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1. **When to collect:** The samples should be collected on the day specified in the Child Activity Diary. Allow some time for your child to do his/her regular activities. Take the hand wipe samples **before you or your child take a bath or wash hands**. Please collect your hand wipe sample **before** you collect the sample from your child.
 2. **How to do it:**
 1. Remove the wipe from the jar, and open the wipe to a 4" x 4" square.
 2. Hold the wipe (Figure 1) and, with moderately firm pressure, wipe your hand (the hand you use most often) including the back, front, and sides of the hands, fingers, and, thumb **one time** (Figure 2). Follow the arrows in the diagram, wiping both sides of the hand from bottom to top.
 3. Fold the wipe inside out, turning the contacted surface to the inside (2" x 4").
 4. Repeat step 2 to wipe your other hand.
 5. Fold the wipe into its original size (2" x 2") with the contacted surfaces now on the inside and put it back in its jar.
 6. Write the date and time the hand wipe sample was collected on the label of the jar.
 7. Store the samples in a refrigerator (or in the cooler provided by us).
 8. Put on a **clean** pair of latex gloves, and collect a hand wipe sample from your child by repeating steps 1 – 7. Discard the used gloves.

If you have any questions about the hand wipe sample collection, please call Christopher Lyu, Field Team Leader, at 1-877-810-9530, ext. 506 (this is a free call). Thank you very much for your assistance.

Figure 1.

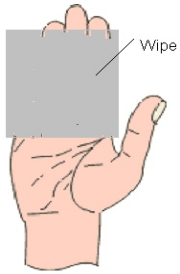


Figure 2.

