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Title: Dust Sampling Workplan

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TITLE: DUST SAMPLING WORKPLAN

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DUST SAMPLING WORKPLAN

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1.0 SCOPE AND APPLICATION

The pollutants selected as the public health issues for the NHEXAS pilot study include Pb and As which can be found in housedust. Collection of housedust samples is necessary in the study because of the potential for dermal or ingestion exposure to these contaminants upon contact with housedust. Wipe sampling will be conducted to determine the levels of these contaminants in house dust on a Fg/cm^2 and a Fg/g basis. The selection of the surfaces from which dust will be collected will be based upon the availability of the surface for contact by an adult or child. Two wipe samples will be collected from each of two locations for a total of four samples during the visit planned for each residence. Two samples will be collected for Pb and other heavy metal analysis and two will be collected specifically for As analysis.

Dust samples will be collected from the homes on three different occasions. The first suite of samples will be collected during the home visit by a member of the RTI study team. In addition to the wipe samples, a clean surface will be placed in a remote area of the selected homes where dust will settle on it for at least four weeks. The surface will be mailed to EOHSI where the dust will be removed from the surface for analysis. A second surface will be put in place and the process will be repeated. A small doormat will be placed on the floor within selected homes to collect dust and dirt. The doormat will be mailed to EOHSI where the dust will be removed from the doormat for analysis.

All analytical and sample information will be assembled and returned to RTI for inclusion within the database for the entire pilot study. The data will eventually be returned to EOHSI for use in the pilot study exposure assessment.

2.0 SAMPLE COLLECTION OVERVIEW

Wipe samples of house dust will be collected on filter media in accordance with the standard operating procedure for wipe sample collection for the chemical(s) of interest. Wipe samples will be collected using the LWW method in all of the homes and using the WWT in 25% of the homes. Using the LWW method, dust will be collected from surfaces by wiping them with polyethylene filters (Nuclepore drain disks). A template will be used to

demarcate a 150 cm^2 area on the surface within which the sample will be collected. A pre-weighed set of three filters will be used in sequence to wipe the surface within the template. The first two filters will be moistened with Type I water to facilitate dust collection but the third filter will be applied dry to collect residual dust and water on the surface. A minimum of two areas will be sampled per home per visit. The WWT samples will be collected by wiping a surface demarcated by a 150 cm^2 template with a commercially available wetted cleaning towlette.

Prior to departure from selected residences, a clean flat surface will be placed in a remote location within the home and left for at least four weeks. After that time the surface will be packed by a member of the household and shipped to RTI for log in and then to EOHSI where the dust will be removed from the surface. The resident will place a new flat surface in the same location for two weeks and ship it in the same manner as the first surface.

During the initial home visit, a small doormat will be placed on the floor in a heavily trafficked area of selected homes. The mat will be mailed up from the home after the sampling period and the dust will be collected for analysis by a vacuum sampling method at EOHSI.

A record of all data relevant to each sample will be maintained. A custody record will accompany each sample throughout its processing. Samples will be labeled to ensure proper identification. The mass of the dust collected will be determined by weighing the filter media before and after collection of the sample.

3.0 SAMPLE COLLECTION MATERIALS AND SYSTEMS

Dust Sampling Equipment List

1. Pre-weighed filters (Nuclepore polyethylene drain disks)
2. LWW wipe samplers
3. WWT towlettes and template
4. Settled Dust collection surfaces
5. Settled dust collector mailers and mailing instructions
6. Tweezers

7. Prewetted sponges
8. Powderless gloves
9. Kim wipes
10. Zip-lok style polyethylene bags
11. Doormats prepackaged in mailing tubes

4.0 PREPARATION OF MATERIALS

Filter media to be used with the LWW sampler will be placed inside a chamber in the weighing room for 24 hours prior to weighing to equilibrate them to the room humidity. The filters will be weighed in sets of three. Each set will be assigned an ID code and its mass will be recorded in a notebook. The filters will be weighed in accordance with the standard operating procedure for weighing wipe sample media. The LWW Samplers will be washed in a 10% nitric acid solution, rinsed in deionized water and air dried at EOHSI prior to being shipped to the field. After the initial use, the samplers will have to be rewashed in the field prior to use with deionized water.

5.0 SAMPLE COLLECTION

Wipe samples will be collected using the LWW method in all of the homes and using the WWT in 25% of the homes. Samples will be collected using the standard operating procedure for the appropriate method. Wipe samples will be collected from two locations: a) the sill of a window that is open when weather permits and b) a bare flat surface in a main living area. Two samples will be collected from each of the two locations; one for Pb, Cr, and Cd analysis at EOHSI and one for As analysis at RTI.

The clean surface to collect settled dust should be placed in a living area on a surface approximately 5 to 7 feet above the floor in accordance with the guidelines for the settled dust collector. The doormat should be placed in a heavy traffic area within the home in accordance with the guidelines outlined below.

6.0 SAMPLE STORAGE AND SHIPMENT

Upon delivery to the lab, the wipe samples should be dried prior to shipment following the procedure for drying LWW samples. The samples should be shipped via next day mail to EOHSI for analysis. Samples should be shipped during the week so that they do not sit in the mail over the weekend. This will eliminate the need to refrigerate the samples during shipment.

Upon delivery to EOHSI, the wipe samples will be laid out in a chamber in the weighing room for 48 hours to dry. After the drying period, the final mass of the filters will be measured in accordance with the standard operating procedure for weighing wipe sample filter media.

7.0 QA/QC PROCEDURES

1. Each sample will be assigned a unique sample ID which will conform to the NHEXAS coding scheme.
2. A standard operating procedure will be followed for weighing the filter media.
3. Initial and final weights of the sampling media will be recorded in a notebook.
4. Samples of the sample collection media will be analyzed for background levels of the target contaminants prior to use.
5. A standard operating procedure will be followed for collecting the wipe samples.
6. All sample collection apparatus will be cleaned prior to implementation in the field in accordance with the standard operating procedures.
7. All samples will be labeled to ensure proper identification.
8. All data relevant to the collection of the sample will be recorded in a data base.
9. A custody record will accompany each sample throughout its collection, handling, and analysis.

10. A duplicate sample will be collected and analyzed for a percentage of the samples as defined in the study QSIP.
11. Field blanks will be collected and analyzed.

STANDARD OPERATING PROCEDURE

FIELD CLEANING OF THE LWW WIPE SAMPLER

1. Soak the samplers in deionized water for a minimum of 1 hour.
2. Scrub the samplers with a clean bristle brush (a new toothbrush will do) to remove any dirt.
3. Rinse the samplers with deionized water.
4. Allow samplers to dry in a clean, dry environment.

STANDARD OPERATING PROCEDURE

PRELOADING THE LWW SAMPLER

1. Work on a clean surface.
2. Select the filter set to be used to load the samplers.
3. Carefully unfold the foil that contains the filter set. If any foil tears off, be sure to collect the pieces and wrap them in the foil with the filters after collecting the sample as the foil is weighed with the filter set to reduce sample handling.
4. Using the forceps pick up one of the filters by its edge.
5. Place the filter over the frame so that the shortest length of the filter lays across the longest dimension of the frame.
6. Continue to hold the filter edge with the forceps.
7. Position the rectangular block over the filter. The grooves in the side of the block should be at the top.
8. Gently press the block down on top of the filter and into the frame until it is flush with the work surface. The edges of the filter should be clamped between the block and the frame.
9. Release the filter from the forceps.
10. Pick the unit up and gently press down on the top of the block until it snaps into the frame. The filter should now protrude from the bottom of the frame.
11. Place the loaded sampler in a clean plastic bag.
12. Load the two remaining filters into samplers in the same manner.
13. Place the foil in which the filters were wrapped in the plastic bag.
14. Seal the plastic bag.

STANDARD OPERATING PROCEDURE
SURFACE WIPE SAMPLING
WITH THE LWW SAMPLER

I. SELECTION OF SAMPLING LOCATION

Only readily accessible areas of a surface will be sampled. Only flat, rigid, smooth surfaces should be sampled by this method. Each sample will consist of three sequential wipes. The three filters comprising the individual sample are referred to as a filter set. The criteria for selecting sampling locations are as follows:

1. A windowsill should be sampled in a main living area. If the windows do not have windowsills, a window well can be sampled instead. Windows that are regularly open should be given preference.
2. The second surface to be sampled should be a flat smooth surface located in a main living area. The major criteria for selecting the second location are the potential for dermal contact and the amount of dust present. The surfaces which the occupants come in most frequent contact with may be cleaned frequently and not have sufficient dust for a sample. In this case another surface in the main living area will be selected. The overall selection criteria in order of preference are as follows:

a. A dusty surface that the occupants come in frequent contact with.
b. A dusty surface in a main living area from approximately one to four feet above the floor.
c. A dusty surface in a main living area between approximately four to seven feet above the floor.

II. SAMPLE COLLECTION

Powderless gloves should be worn during the collection of the wipe sample. Be careful handling the foil as it is weighed along with the filters.

1. Select an area to be sampled and place the template with the silicon padding facing down on the surface. The silicone pads should be replaced for each home. The surface must be at least 3.25 inches wide by 13 inches long in order to accommodate the template. If side by side samples are to be collected, the surface must be large enough to accommodate two templates, i.e., 6.5 inches wide by 13 inches long or 3.25 inches wide by 26 inches long.
2. Place a clean work surface, such as aluminum foil, or a teflon sheet, near the sampling location.
3. Select a bag containing three preloaded LWW samplers.
4. Select a plastic box containing a prewetted sponge, open the box and place it down next to the clean work surface.
5. Remove the teflon coated aluminum foil from the plastic bag, unfold it, and lay it on the clean surface with the green side facing up.
6. Remove one of the preloaded LWW samplers from the plastic bag.
7. Holding the sampler with the filter facing down, press the filter down on the prewetted sponge.
8. Remove the sampler from the sponge.
9. Place the sampler at one end of the template (within the cutout) so the filter contacts the surface to be sampled.
10. Slide the sampler across the length of the template stopping approximately 1 inch from the opposite end.
11. Lift the filter unit a few millimeters off of the surface and place it down at the edge of the template, opposite from the starting position. (*Sliding the filter unit completely to the end may push some dust to the extreme edge of the template making it difficult to recover.*)
12. Slide the filter unit back across the length of the template stopping approximately 1 inch from starting position.
13. Lift the filter a few millimeters off of the surface and place it down at the edge of the template, returning it to the starting position.

14. Repeat steps 10 through 13 two additional times so that the filter has been wiped three times back and forth across the surface within the template.
15. Turn the filter unit upside down and hold it over the teflon coated foil.
16. Using thumb and index finger of one hand, grab the exposed edges of the block and slide the block and filter out of the frame while holding the frame with the other hand.
17. Remove the filter from the block using the forceps and place it on the foil with the dust facing up.
18. Select a second preloaded LWW sampler from the plastic bag and repeat steps 7 through 16.
19. Remove the filter from the block using the forceps and place it on the foil with the dust facing down.
20. Remove the final preloaded LWW sampler from the plastic bag and repeat steps 9 through 16. Do not wet the filter.
21. Remove the filter from the block using the forceps and place it on the foil with the dust facing down.
22. Carefully fold the foil around the filters. If any pieces of the foil tear off, wrap them inside the foil with the filters.
23. Replace the foil in the plastic bag.
24. Be sure to complete the sample collection record.

STANDARD OPERATING PROCEDURE

FIELD DRYING THE LWW SAMPLES

1. Line a clean cardboard, polyethylene, or other drying box with a clean, non-static material such as aluminum foil.
2. Select a sample and unfold the foil it is wrapped in exposing the filter media to the air. **Wear powderless gloves when handling the samples.**
3. Place the sample in the box.
4. Repeat this procedure for all the samples to be dried.
5. Loosely place the lid on the box or cover the box with aluminum foil.
6. Allow the filters to dry for 36 to 48 hours before refoiling them in the foil and shipping them to EOHSI.

STANDARD OPERATING PROCEDURE

PACKAGING THE WWT MEDIA

Wear powder free gloves when packaging the sampling media. Work on a clean surface.

1. Using clean forceps, remove a towlette from the plastic box in which they are purchased.
2. Fold the towlette until it is small enough to fit in the zippered polyethylene bags provided.
3. Place the towlette in a bag and close the bag.
4. Affix an identification label to the bag.

STANDARD OPERATING PROCEDURE

SURFACE WIPE SAMPLING WITH THE WWT SAMPLER

Only readily accessible areas of a surface will be sampled. Only flat, rigid surfaces should be sampled by this method. Avoid sampling on furniture where the surface may be damaged. Use the guidelines in the standard operating procedure for collecting LWW samples for selecting the surface to be sampled.

Powderless gloves will be worn during the collection of the wipe sample

1. Select an area to be sampled and place the template with the silicon padding facing down on the surface. The silicone pads should be replaced for each home. The surface must be at least 3.25 inches wide by 13 inches long in order to accommodate the template. If side by side samples are to be collected, the surface must be large enough to accommodate two templates, i.e., 6.5 inches wide by 13 inches long or 3.25 inches wide by 26 inches long.
2. Place a clean work surface, such as aluminum foil, or a teflon sheet, near the sampling location.
3. Select a zippered polyethylene bag containing the WWT sampling media.
4. Remove the towlette from the bag.
5. Applying moderate pressure, wipe the area inside of the template as clean as possible.
6. Return the towlette to the bag.
7. Repeat this procedure for each surface to be wiped.
8. Be sure to complete the sample collection record.

INSTRUCTIONS FOR THE SETTLED DUST COLLECTOR

1. The settled dust collector should be placed in a living area, i.e., a room in which the participant spends a considerable amount of time when at home.
2. The following guidelines should be used to help find a location for the settled dust collector.
    a. Place the settled dust collector on a flat surface that is between 5 to 7 feet above the floor in a main living area where it will remain undisturbed for the collection period.
    b. Do not place the settled dust collector near electronic appliances such as television sets and stereos.
    c. Do not place the settled dust collector near a fireplace, wood stove, kerosene heater or electric heater.
    d. Do not place the settled dust collector near an air duct, fan, or open window.
    e. Do not place the settled dust collector near an ashtray.
    f. Avoid contact between the settled dust collector and a wall whenever possible.
    g. Place the settled dust collector on the surface so that the fold is pointing toward you.
4. Instruct the participant on packaging and shipping the settled dust collector and as to when this should occur.
5. Instruct the participant as to placing the second sampler and when to ship the sampler to EOHSI.
6. Complete the data collection record.

INSTRUCTIONS FOR SHIPPING

THE SETTLED DUST COLLECTOR

1. Very gently fold the sampler in half.
2. Remove the binder clip and the plastic bag from the padded envelope.
3. Fasten the binder clip to the long edge of the sampler that is not taped.
4. Write the date on the sampler.
5. Place the dust sampler inside the plastic bag and fold over the open end.
6. Place the sampler inside the padded envelope.
7. Peel the white paper strip off the flap of the envelope.
8. Fold over the flap and seal the envelope.
9. Please write the date on the envelope next to the address label.
10. Mail the envelope. POSTAGE IS PREPAID.

GUIDELINES FOR SELECTING THE LOCATION FOR THE DOORMAT

The procedures for collecting the carpet sample from residences are subject to change as experience is gained in dealing with this type of sample.

The carpet should be placed on the floor of the residence in a heavily trafficked area. The following steps should be used to place the carpet.

1. Select the location where the carpet is to be placed.
2. Remove the carpet from the shipping container and place it on the floor at the entrance.
5. Instruct the participant that the carpet should be packed in the pre-labeled, postage paid shipping container and shipped to EOHSI after the sample collection period.
6. Complete the data collection record.

INSTRUCTIONS FOR SHIPPING THE DOORMAT

1. Please do not pick up the mat; leave it on the floor.
2. Remove the white end cap marked OPEN from the mailing tube.
3. Remove the plastic bag, wire twist, and rubber bands from inside the mailing tube.
4. With the mat laying on the floor, grab one of the short edges of the mat and fold it over to meet the other short edge.
5. Grab both of the short edges and roll up the mat toward the fold. Roll up the mat as tightly as possible.
6. Wrap a rubber band around each end of the rolled up mat.
7. Place the mat in the plastic bag.
8. Seal the bag with the wire twist.
9. Place the bag containing the doormat inside of the mailing tube.
10. Fasten the white plastic end cap securely in the open end of the tube. The portion of the cap with the ridges goes inside the tube.
11. Please write the date on the mailing tube by the address label.
12. Please deliver the tube to the post office. The tube is pre addressed and the POSTAGE IS PREPAID.

I. Sample Identification

Sample ID: _____

II. Sampling

Sample collected by: _____ Date: ___/___/___

Sample transported by: _____ Date: ___/___/___

Sample received by: _____ Date: ___/___/___

III. Post Sampling

Filter set weighed by: _____ Date: ___/___/___

IV. Analytical

Analytical method: _____

Analyzed by: _____ Date: ___/___/___

Figure 1. Information to be collected on the surface wipe sample custody record.

I. Sample Identification

Sample ID: _____

II. Sampling

Sampler placed by: _____ Date: ___/___/___

Sampler received/stored by: _____ Date: ___/___/___

III. Post Sampling

Prepared for analysis by: _____ Date: ___/___/___

IV. Analytical

Analytical method: _____

Analysis performed by: _____ Date: ___/___/___

Figure 2. Information to be collected on the settled dust custody record.

I. Sample Identification

Sample ID: _____

II. Sampling

Doormat placed by: _____ Date: ___/___/___

Doormat received/stored by: _____ Date: ___/___/___

III. Post Sampling

Prepared for analysis by: _____ Date: ___/___/___

IV. Analytical

Analytical method: _____

Analysis performed by: _____ Date: ___/___/___

Figure 3. Information to be collected on the carpet dust custody record.