Attachment C

Collection of Indoor Dust Samples from Carpeted Surfaces for Chemical Analysis Using a Nilfisk GS-80 Vacuum Cleaner

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1.0 SCOPE AND APPLICATION

The purpose of this Standard Operating Procedure (SOP) is to define the procedures for collection of carpet-embedded dust samples that can then be analyzed for lead, pesticides, or other chemical compounds and elements. This procedure is applicable for the collection of samples on a variety of surfaces.

These are standard (i.e., typically applicable) operating procedures which may be varied or changed as required, dependent upon site conditions, equipment limitations or limitations imposed by the procedure. In all instances, the ultimate procedures employed should be documented and associated with the final report.

Mention of trade names or commercial products does not constitute U.S. Environmental Protection Agency (U.S. EPA) endorsement or recommendation for use.

2.0 METHOD SUMMARY

Sample collection is performed utilizing the Nilfisk GS-80 vacuum cleaner equipped with a high efficiency particulate air (HEPA) filter. A diagram of the Nilfisk GS-80 vacuum cleaner is presented in Figure 1. Soil and other particulate matter with aerodynamic diameters of approximately 5-micrometers (□m) and larger, that are embedded within the carpet, are collected and returned to the laboratory for sieving and analysis.

3.0 SAMPLE PRESERVATION, CONTAINERS, HANDLING AND STORAGE

Following collection of the sample into a dedicated collection bag, the bag is removed from the vacuum cleaner and placed into a 32-ounce glass jar or a zip-lock plastic bag. Storage of the samples at ambient temperature is appropriate for samples that will be analyzed only for metals.

Note: Samples for organic analysis should be maintained at approximately 4^0C.

4.0 INTERFERENCES AND POTENTIAL PROBLEMS

There are no known interferences with this method.

5.0 EQUIPMENT/APPARATUS

5.1 Equipment List

-Nilfisk Model GS-80 vacuum cleaner
-Two meter folding ruler or similar device
-Masking tape
-Clean aluminum foil
-Shaker sieve, as specified in ASTM D4222, with 100-mesh screen
-Analytical balance [sensitive to a minimum 0.1 milligram (mg) and weighing range of 0.1mg - 1000 grams(g)].
-Distilled water
-Methanol
-Kimwipes ™ or other laboratory tissue

-Vacuum collection bags
-Bottle brush
-Scrub brush
-Polyliners
-32-ounce glass jars

6.0 REAGENTS

Methanol and distilled water are required for sampling train cleaning and decontamination.

7.0 PROCEDURES

7.1 Preparation

The overall sampling strategy should be designed to address the goals of the investigation. Users should consider factors such as foot traffic volume, types of activities, and proximity to potential sources. The sampling strategy should be described in the Quality Assurance Work Plan (QAWP) prepared prior to the sampling event. The ideal sampling locations are those areas that conform with the overall sampling strategy. For example, protocol may require the selection of a carpeted area for sampling where small children play or are likely to play.

1. Determine the extent of the sampling effort, the sampling methods to be employed, the amount of dust needed to reach the desired detection limit and the types and amounts of equipment and supplies needed.

2. Obtain and organize the necessary sampling and monitoring equipment.

3. Decontaminate or pre-clean equipment, as specified in Section 7.5, and ensure that it is in working order.

4. Prepare schedule and coordinate with staff, client, regulatory agency, as appropriate.

5. Perform a general site survey prior to site entry in accordance with the site-specific Health and Safety Plan.

6. Measure the area to be sampled and outline it using masking tape or other appropriate methods. Draw a diagram of the room(s) where the sample(s) were taken, locating the sampled area(s).

7.2 Calibration Procedures

The Nilfisk GS-80 vacuum cleaner has no flow devices that need calibration prior to sampling. The sampling train shall be thoroughly inspected to ensure that it has been cleaned, properly assembled, and complete.

7.3 Field Operations

1. Prior to sample collection at the location to be sampled, complete a sample data

sheet, recording all requested information and sketch the area to be sampled. A sample data sheet is provided in Figure

2. Select a sampling area according to the established protocol defined in the QAWP. In most cases, three rooms per floor are selected for sampling in each building. Each sample is collected with a dedicated sampling train that has been properly assembled, cleaned, and decontaminated to ensure sample integrity. The size/weight of each sample is dependent on the goals and objectives of the sampling event, the analyses requested, and the desired method detection levels (MDLs). A 100-gram sample is highly desirable if multiple analyses (metals, pesticides, etc.) are requested. A minimum 5-10-gram sample is required for metal analysis.

3. Utilizing the 2-meter folding ruler or any other measuring device, outline and mark the recommended 1-m^2 portion of the carpet to be sampled.

4. Begin the sample collection at one corner of the delineated sample area, moving the sampler back and forth four times over a strip running in a straight line between the defined sampling area edges. The width of the strip is defined by the width of the sampling nozzle. After completing the first strip, angle over to the second strip gradually on the next pass, again completing four double passes.

5. Continue sampling the area delineated until an adequate sample is collected. To determine if adequate sample weight will be collected, one must use visual judgement or perform the finger judgement test on the carpet to judge the dust loading of the carpet and make a decision on whether to sample the recommended 1-m^2 area or a larger area. If sampling a larger area, measure the area accurately and document.

6. Wearing surgical gloves, make sure to tap with your hand on the nozzle inlet to dislodge any dust remaining in the nozzle or the hose. This procedure will ensure complete sample recovery. Turn off the vacuum cleaner and allow to sit undisturbed for at least 30 seconds. Unsnap the two vacuum container clips to access the inside of the container. Remove the polyliner and the vacuum collection bag within it. Then seal off the polyliner with the vacuum collection bag inside, and transfer to a properly labeled 32-oz. glass jar or plastic bag. Document the sample and store for shipping to the laboratory.

7.4 Laboratory Operations

Upon arrival at the laboratory, recovery of the dust samples from the GS-80 dedicated collection bags is accomplished by the following procedure:

1. Select a clean working area in the laboratory where recovery of the samples is to be performed (a 4-foot by 4-foot area will be sufficient). Make sure that the following equipment/apparatus is available, assembled, and in good working condition:

-Shaker sieve (No. 100), as specified in ASTM D-422 with particle size separation of 150 □m. A complete set consists of

three components: the cover, the screen, and the receiver pan. The receiver pan must be pre-weighed and its weight recorded.

-Sieve shaker for mechanical sieving. Models readily available are CSC Scientific Company, Inc. Catalog No. 18480 and Thomas Scientific Catalog No. 8324-A10 (Tel 800 345-2100).

-Analytical balance sensitive to a minimum 0.1 milligrams (mg) and weighing range of 0.1 mg to 1000 grams (g).

-Surgical gloves. Thomas Scientific Catalog No. 5761-W14.

-Disposable dust mask. Thomas Scientific Catalog No. 8055-M20.

-Camel=s Hair Brush. Fisher Scientific Catalog No. 03-655.

-Clean aluminum foil.

-KimwipesJ or other laboratory tissue.

2. Wearing clean surgical gloves to handle the bags and a dust mask for dust protection, retrieve the vacuum collection bags from the 32-ounce glass jars used to transport the bags from the field to the laboratory.

3. Empty the contents of the bag into the No. 100-mesh sieve screen through the bag opening. Complete this operation by removing the plastic adaptor from the collection bag inlet. Shake the bag as necessary to ensure all the contents have been transferred through the screen to the receiver pan.

4. Place the cover on the sieve screen and manually or mechanically shake the sieve for a minimum of 5 minutes and a maximum of 10 minutes until all the fine dust particles are collected in the bottom receiver pan. If manual shaking is performed, the directions in D-422 of ASTM must be followed: AConduct the sieving operation by means of a lateral and vertical motion of the sieve, accompanied by a jarring action in order to keep the sample moving continuously over the surface of the sieve. Continue sieving until not more than 1 mass percent of the residue on a sieve passes that sieve during 1 minute of sieving@.

5. If mechanical shaking is performed, set up the recommended sieve shaker on an even and stable surface. Proceed with the sieving operation following directions in the manufacturer's manual.

6. Re-weigh the receiving pan utilizing the analytical balance. The difference in weight is the weight of the sieved sample. If total weight of material is desired, the coarse material remaining on top of the sieve must be collected on a pre-weighed sheet of aluminum foil, re-weighed and the weight added to the weight of the sieved sample.

7. Transfer the sieved sample from the receiving pan to an 8-ounce wide mouth glass jar. Use the camel's hair brush to ensure complete transfer of the sample. Cap glass jar and secure sample.

8. Document each sample. Each sample must be provided with the following information: identification number, date of sampling, location, analysis requested. Each sample must be recorded into a chain-of-custody form before delivery to the analytical laboratory.

9. Before processing the next sample, thoroughly wipe clean the shaker sieve set with a KimwipeJ Wait until dry. Repeat steps 1 through 7.

7.5 Sampling Train Decontamination

To decontaminate the sampling trains, move them to a well ventilated area and perform the following:

1. Assemble one of the sampling trains to be used as the decontamination unit for decontaminating the nozzles, hoses, and wands. This unit must be provided with a clean polyliner and dust bag.

2. With the vacuum cleaner turned on and wearing clean surgical gloves, the nozzles, wands, and hoses are decontaminated using the bottle brush to remove any accumulated dust in the hose and nozzle. Make sure to tap with your hand on the nozzle to remove any visible dirt that have accumulated and use the scrub brush to remove any hair or fibers entangled on the nozzle=s brush . When the nozzle is considered to be clean, remove and spray with reagent grade methanol and allow to air dry on a clean surface. The wand and hose are then cleaned with the bottle brush. Make sure to tap with your hand on the wand inlet while cleaning with the bottle brush to remove any visible dirt. Repeat this procedure to decontaminate the other nozzles, wands, and hoses.

3. Pull out the dirty dust bag from the decontamination unit and wipe clean the inside of the container with distilled water. Do the same to the other containers. Spray the inside of the containers with methanol and allow to air dry. If decontaminating in between homes, wipe cleaning the inside of the containers with distilled water is sufficient.

8.0 CALCULATIONS

The dust weight calculations for the final sieved dust fraction is performed in accordance with ASTM Method D 422. Dividing the final dust weight by the area sampled (expressed in m^2) provides dust loading in grams per squared meter (g/m^2). When the analysis results are received, the loading of analyte per square meter of carpet area (ug/m^2) can be calculated in the same way. Analysis will also provide mg/kg concentration. If total (gross) dust loading of the sampled area needs to be calculated, the total dust weight before sieving must be obtained. The total dust weight is divided by the area sampled to obtain total dust loading per square meter.

9.0 QUALITY ASSURANCE/QUALITY CONTROL

There are no specific quality assurance activities which apply to the implementation of these procedures. However, the following general QA procedures apply:

1. All data must be documented on field data sheets or within site logbooks.

2. All instruments must be operated in accordance with operating instructions as supplied by the manufacturer, unless otherwise specified in the work plan. Equipment checkout and calibration activities must occur prior to sampling/operation and they must be documented.

10.0 DATA VALIDATION

Results of the quality control samples will be evaluated for contamination. This information will be utilized to qualify the environmental sample results accordingly with the project's data quality objectives.

11.0 HEALTH AND SAFETY

When working with potential hazardous materials, follow U.S. EPA, OSHA and corporate health and safety procedures.

12.0 REFERENCES

American Society For Testing And Materials, Standard Practice for Collection of Dust from Carpeted Floor for Chemical Analysis, Designation D 5438-93, Reprinted from the Annual Book of ASTM Standards, Philadelphia, PA.

American Society For Testing And Materials, Standard Test Method for Particle Size Analysis of Soils,Designation D 422-63, Reprinted from the Annual Book of ASTM Standards, Philadelphia, PA.

Instructions for Use-Nilfisk Model GS 80, Nilfisk of America, Inc.,Malvern, PA (1987).