Collection of Surface Wipe Samples for Analysis of Semi-Volatile Organic Compounds (SVOCs)

BkA Guide 10-01

July 2010

Introduction

This guide is intended for investigations involving wipe sampling for semi-volatile organic compounds (SVOCs) on potentially contaminated surfaces. Wipe samples subsequently are analyzed in the laboratory for individual SVOCs (i.e., polycyclic aromatic hydrocarbons and/or phthalate esters) by gas chromatography/mass spectrometry (GC/MS). Determining the appropriate sampling strategy is a critical first step to achieving a study's objectives. Additionally, field wipe samples must be collected properly to obtain meaningful results. Specific procedures covered in this guide include selecting the type of wipe, wetting the wipe with solvent, controlling the sampling process, reducing sources of SVOC contamination, and handling of the wipe sample.

Sampling Strategy

1. In order to achieve quantitative results, the area to be sampled must be measured and delineated prior to sampling. The minimum recommended sampling area is 10 cm by 10 cm, or 100 cm^2. This area can be increased to produce lower quantitation limits if required by the investigation. The quantitation limits are determined by the sensitivity of the analytical system for the target compounds and the blank levels, if any. For example, the analytical lower limits of quantitation (estimated as three times the method detection limits) are approximately 0.02 µg/wipe for PAH, 0.1 µg/wipe for phthalate esters consisting of a single isomer, and 1 µg/wipe for phthalate mixtures. Assuming a sampling area of 100 cm^2 and no background contamination, the corresponding lower limits of quantitation for the area sample are 2 µg/m^2 for PAH, 10 µg/m^2 for single isomer phthalates, and 100 µg/m^2 for phthalate mixtures. These values can be reduced by a factor of nine by wiping an area 30 cm by 30 cm or 900 cm^2.
2. Individually wrapped, sterile, surgical gauze pads are recommended for most surface sampling projects. We recommend 4-inch x 4-inch or 3-inch x 3-inch gauze pads, Johnson & Johnson, First Aid® brand as these have been shown to have low background levels. A single pad is wetted with approximately 1 to 2 milliliters (mL) of solvent. For most applications, isopropyl alcohol (rubbing alcohol) is recommended. This can be obtained in drug stores as a 70% solution of isopropyl rubbing alcohol in water. Prior to sampling, ensure that the solvent will not adversely affect the surface material.
3. Different government agencies recommend different wipe procedures for various compounds. Even within a particular field (such as occupational exposure assessments), variations in wipe sampling methodologies have been reported. Most wipe sampling procedures are a manual process, and the technique and the pressure applied for a wiping procedure may vary significantly among field operators. Attempt to standardize the procedure used within an investigation. The sampling record should completely describe the procedure that is used.

4. If a measure of sampling and analysis precision is required, it is recommended that two or more samples be collected at each location.
5. A field blank is highly recommended. Typically only one field blank sample is needed with each batch of wipe samples. The blank sample should be handled, transported and stored identically to the other samples, the only difference being that no sample is collected.

Sampling Procedure

1. Use low-stick masking tape (e.g., 3M Scotch Blue™ painter's tape) to mark off a 10-cm x 10-cm area (4-inch x 4-inch area = 103 cm^2) of the surface to be sampled. As discussed above, a larger area may be used depending upon the requirements of the investigation.
2. Clean gloves are required for handling the sampling media. Nitrile gloves are acceptable. Change gloves with each sample to avoid cross contamination of samples. Remove the Johnson & Johnson, First Aid® brand gauze pad from its package. Unfold the pad so the size is four times its original size. Wet the sample pad with 1 to 2 mL of solvent (i.e., 70 % isopropyl rubbing alcohol). Apply only enough solvent to moisten approximately 80% of the area of the pad. Avoid excess solvent on the pad as it may cause drips and running on the surface thus diluting the sample.
3. Unless another technique is dictated, collect the sample by wiping the marked part of the surface in one direction with firm strokes using full contact pressure. Fold the pad in half with the initially exposed surface facing inward and wipe the surface again in the opposite direction. Fold the pad in half again (i.e., in quarter) with the exposed surface facing inward. Wrap the pad in aluminum foil making an airtight package. Place the package in its own zip-lock plastic bag and label the bag with the sample identification.
4. If the surface is very rough, a dabbing action may be substituted for the full contact pressure rubbing of the media across the surface. When dabbing, make sure to completely cover the same area as in the pressure rubbing. Record the procedure.
5. Record the sample identification, surface area sampled and the description of the sample and surface in your field notes and on the chain-of-custody (COC) form.

Handling, Storage and Transport

1. Store, transport and ship wipe samples tightly enclosed in their packages. Avoid subjecting the wipe samples to elevated temperatures such as might occur in closed vehicles parked in the sun. It is recommended that wipe samples be transported and shipped in an ice chest using an ice pack to keep the wipe samples cool. Return the wipe samples to Berkeley Analytical for analysis as soon as possible after the collection of samples. If wipe samples must be stored prior to shipment, keep them in a clean refrigerator or freezer.
2. When submitting samples to Berkeley Analytical for analysis, be sure to clearly indicate what services are desired. The COC form is available for download on the Berkeley Analytical website if you do not already have an appropriate form.

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