Fact Sheet

LOSSES OF VOLATILE ORGANIC COMPOUNDS FROM SOIL DURING SAMPLE COLLECTION, STORAGE, AND LABORATORY HANDLING

PROBLEM

The collection of soil samples by site investigators using the commonly accepted practice of filling a bottle to near capacity for shipping and storage is suspect. Often the utensils (spoons, paint scrapers, trowels, spatulas, and wooden tongue depressors) used during the transfer of soil to and from the storage bottle fail to maintain the soil structure, thus allowing for the exposure of a random amount of soil surface area and thereby losing weakly sorbed and physically trapped volatile organic compounds (VOCs). Also, when filling a bottle to near capacity, the sealing surfaces inevitably become soiled, compromising leak-free containment. These problems result in the loss of sample integrity and generation of data that do not represent the true concentration of VOCs in the soil being investigated.

SOLUTION

The U.S. Army Cold Regions Research and Engineering Laboratory, in conjunction with the Army Environmental Center, has developed a transfer method that maintains sample integrity during sampling, shipping, storage, and analysis. Subsamples weighing two to five grams are immediately isolated from vapor loss by enclosing them in a volatile organic analysis (VOA) vial. A 10-cc plastic syringe, from which the end has been removed, is used to obtain an intact plug of soil from a freshly exposed surface, and to deposit the sample into the mouth of a 40-mL VOA vial. Comparison shows that VOC concentrations for samples collected using the new procedure can be as much as one to two orders of magnitude greater in concentration than samples collected and stored using the commonly accepted procedure. Samples collected by the new procedure can be analyzed by either headspace gas chromatography or by purge-and-trap gas chromatography mass spectrometry.

CONTACT

Alan D. Hewitt
603-646-4388
ahewitt@crrel.usace.army.mil

January 1994

US Army Corps of Engineers
Cold Regions Research & Engineering Laboratory

CRREL, 72 Lyme Road, Hanover, NH 03755-1290