



Designation: D7758 – 17

Standard Practice for Passive Soil Gas Sampling in the Vadose Zone for Source Identification, Spatial Variability Assessment, Monitoring, and Vapor Intrusion Evaluations¹

This standard is issued under the fixed designation D7758; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope*

1.1 *Purpose*—This practice covers standardized techniques for passively collecting soil gas samples from the vadose zone and is to be used in conjunction with Guide [D5314](#).

1.2 *Objectives*—Objectives guiding the development of this practice are: (1) to synthesize and put in writing good commercial and customary practice for conducting passive soil gas sampling, (2) to ensure that the process for collecting and analyzing passive soil gas samples is practical and reasonable, and (3) to provide standard guidance for passive soil gas sampling performed in support of source identification, spatial variability/extent determinations, site assessment, site monitoring, and vapor intrusion investigations.

1.3 This practice does not address requirements of any federal, state, or local regulations or guidance or both with respect to soil gas sampling. Users are cautioned that federal, state, and local guidance may impose specific requirements that differ from those of this practice.

1.4 *Units*—The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

1.5 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.6 *This practice offers a set of instructions for performing one or more specific operations. This document cannot replace education or experience and should be used in conjunction with professional judgment. Not all aspects of this practice may be applicable in all circumstances. This ASTM standard is not intended to represent or replace the standard of care by which the adequacy of a given professional service must be judged,*

nor should this document be applied without consideration of a project's many unique aspects. The word "Standard" in the title means only that the document has been approved through the ASTM consensus process.

1.7 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 ASTM Standards:²

[D653 Terminology Relating to Soil, Rock, and Contained Fluids](#)

[D1356 Terminology Relating to Sampling and Analysis of Atmospheres](#)

[D2216 Test Methods for Laboratory Determination of Water \(Moisture\) Content of Soil and Rock by Mass](#)

[D2487 Practice for Classification of Soils for Engineering Purposes \(Unified Soil Classification System\)](#)

[D3740 Practice for Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction](#)

[D4597 Practice for Sampling Workplace Atmospheres to Collect Gases or Vapors with Solid Sorbent Diffusive Samplers](#)

[D5088 Practice for Decontamination of Field Equipment Used at Waste Sites](#)

[D5314 Guide for Soil Gas Monitoring in the Vadose Zone \(Withdrawn 2015\)³](#)

[D5792 Practice for Generation of Environmental Data Related to Waste Management Activities: Development of Data Quality Objectives](#)

¹ This practice is under the jurisdiction of ASTM Committee [D18](#) on Soil and Rock and is the direct responsibility of Subcommittee [D18.21](#) on Groundwater and Vadose Zone Investigations.

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² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

³ The last approved version of this historical standard is referenced on www.astm.org.

*A Summary of Changes section appears at the end of this standard

D6196 Practice for Choosing Sorbents, Sampling Parameters and Thermal Desorption Analytical Conditions for Monitoring Volatile Organic Chemicals in Air

D6311 Guide for Generation of Environmental Data Related to Waste Management Activities: Selection and Optimization of Sampling Design

E2600 Guide for Vapor Encroachment Screening on Property Involved in Real Estate Transactions

2.2 U.S. EPA Methods⁴

Method 8260C Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS)

Method 8270C Semivolatile Organic Compounds by Gas Chromatography/Mass Spectrometry

Method TO-17 Determination of Volatile Organic Compounds in Ambient Air Using Active Sampling Onto Sorbent Tubes

3. Terminology

3.1 Definitions:

3.1.1 For common definitions of terms in this standard, refer to Terminology **D653** and **D1356**.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *absorption*, *n*—the penetration of one substance into the inner structure of another.

3.2.2 *adsorption*, *n*—adherence of the atoms, ions, or molecules of a gas or liquid to the surface of another substance (chemisorption).

3.2.3 *ambient air*, *n*—any unconfined portion of the atmosphere; open air.

3.2.4 *blank sample*, *n*—clean sample or a sample of matrix processed to measure artifacts in the measurement process.

3.2.4.1 *Discussion*—Blank samples are named according to their type and use (for example, method blank, trip blank, field blank, and preparation or manufacturing blank).

3.2.5 *desorption*, *n*—the process of freeing from a sorbed state.

3.2.6 *duplicate samples*, *n*—two samples taken from and representative of the same population that are carried through all steps of the sampling and analytical procedures in an identical manner.

3.2.7 *field blank*, *n*—clean sampling media that is carried to the sampling site, exposed to ambient air during field sampling procedures, and transported to the laboratory for analysis (also referred to as an ambient air control sample).

3.2.8 *method blank*, *n*—quality control check to measure laboratory contamination during sample analysis.

3.2.9 *moisture content*, *n*—the moisture present in a material, as determined by definite prescribed methods, expressed as a percentage of the mass of the sample on either of the following bases: (1) original mass; (2) moisture-free (oven dried) mass (see Test Method **D2216**).

3.2.10 *preparation blank*, *n*—quality control check to define the efficiency of conditioning a batch of sorbent samplers at the laboratory for sample collection (also referred to as manufacturing blanks).

3.2.11 *sampling rate*, *n*—the ratio of mass of a given compound collected by a diffusive sampler per unit time of exposure to the concentration of that compound in the atmosphere being sampled. The sampling rate is sometimes referred to as the uptake rate.

3.2.12 *soil gas*, *n*—vadose zone atmosphere; soil gas is the air existing in void spaces in the soil between the groundwater table and the ground surface.

3.2.13 *soil moisture*, *n*—water contained in the pore spaces in the vadose zone.

3.2.14 *sorbent*, *n*—a solid or liquid medium in or upon which materials are collected by adsorption, absorption, or chemisorption.

3.2.15 *sorbent sampling*, *v*—the collection of chemicals from an air or emission sample by allowing the air or emissions to contact a sorbent.

3.2.16 *source*, *n*—area(s) at a site where releases have occurred that are emanating vapors from either the vadose zone or groundwater.

3.2.16.1 *Discussion*—There may be multiple sources at a site and the area over which any one source is defined is subject to interpretation from multiple data sets.

3.2.17 *spatial variability*, *n*—relationship of organic compound mass from one location to many others at a site as a function of distance.

3.2.18 *starvation effect*, *n*—when the analyte uptake rate of a passive sorbent sampler is greater than the replenishment rate of the analyte around the sampler, which results in a low bias measurement.

3.2.19 *trip blank*, *n*—clean, unused sampling media that is carried to the sampling site and transported to the laboratory for analysis without having been exposed to field sampling procedures.

3.2.20 *vapor intrusion*, *n*—migration of a volatile chemical(s) from subsurface soil or water into an overlying or nearby building.

3.3 Acronyms:

3.3.1 *BLS*—Below land surface (also known as below ground surface (bgs))

3.3.2 *QA/QC*—Quality assurance and quality control

3.3.3 *PSG*—Passive soil gas

3.3.4 *SVOC*—Semivolatile organic compound

3.3.5 *VOC*—Volatile organic compound

4. Summary of Practice

4.1 This practice describes the passive collection and subsequent analysis of soil gas samples, using sorbent samplers to trap VOCs and SVOCs in soil vapor by placing samplers in the subsurface for a period of time at multiple locations across a site. Placement of the sampler can be in open soils (that is, not

⁴ Available from United States Environmental Protection Agency (EPA), Ariel Rios Bldg., 1200 Pennsylvania Ave., NW, Washington, DC 20004, <http://www.epa.gov>.