



Designation: E2600 – 22

Standard Guide for Vapor Encroachment Screening on Property Involved in Real Estate Transactions¹

This standard is issued under the fixed designation E2600; 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*—The purpose of this guide is to provide practical guidance and a useful process for conducting a *vapor encroachment screen (VES)* on a property parcel involved in a *real estate transaction* in the United States of America with respect to *chemicals of concern (COC)* that may migrate as vapors into the vadose zone of a property as a result of contaminated soil and/or groundwater on or near the property. This guide may be used in conjunction with E1527 but does not alter or in any way define the scope of that practice. In addition, performance of this guide is not a requirement of and does not constitute, expand, or in any way define “all appropriate inquiry” as defined and approved by the U.S. Environmental Protection Agency (EPA) under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the regulations there under, including 40 CFR Sec. 312.11.

1.1.1 *Vapor Encroachment Condition (VEC)*—The goal of conducting a *VES*, as established by this guide, on a parcel of property is to identify a *vapor encroachment condition (VEC)*, which is the presence or likely presence of *COC* vapors in the vadose zone of the *target property (TP)* caused by the release of vapors from contaminated soil and/or groundwater either on or near the *TP* as identified by Tier 1 (see Section 8) or Tier 2 (see Section 9) procedures.

1.1.2 *Federal, State, and Local Environmental Laws*—This guide does not address requirements of any federal, state, or local laws with respect to vapor intrusion. *Users* are cautioned that federal, state, and local laws, regulations, or policy may impose vapor encroachment screening or vapor intrusion assessment obligations that are beyond the scope of this guide (information is provided in Appendix X5 and Appendix X9). *Users* should also be aware that there may be other legal obligations, for example, disclosure, with regard to *COC* or *COC* vapors discovered on the *TP* that are not addressed in this guide. This ASTM practice does not supersede existing federal, state and local statutes and regulations.

¹ This guide is under the jurisdiction of ASTM Committee E50 on Environmental Assessment, Risk Management and Corrective Action and is the direct responsibility of Subcommittee E50.02 on Real Estate Assessment and Management.

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1.1.3 *Documentation*—The scope of this guide includes investigation and reporting actions. Sufficient documentation of all sources, records, and resources used in the investigation procedures that are set out in this guide should be provided in the *VES report* (refer to Section 10).

1.2 *Objectives*—Objectives guiding the development of this guide are: (1) to synthesize and put into writing a practical guide for conducting a *VES* on a property involved in a *real estate transaction* and (2) to provide that the process to screen for a *VEC* is practical and reasonable.

1.3 *Considerations Outside the Scope*—The use of this guide is strictly limited to the scope set forth in this section. Section 11 of this guide identifies, for informational purposes, certain tasks (not an all-inclusive list) that may be conducted on a property that are beyond the scope of this guide but that may warrant consideration by parties to a *real estate transaction*. Whether to include an investigation of any such conditions in the *environmental professional's* scope of services should be evaluated by the *user* and should be agreed upon between the *user* and *environmental professional* as additional services beyond the scope of this guide before initiation of a *Phase I ESA* conducted in conjunction with a *VES* or initiation of an independent *VES*.

1.4 *Units*—The values stated in inch-pound units are to be regarded as the standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

1.5 *Organization of this Guide*—This guide has eleven sections and nine appendices. The appendices are included for informational purposes and are not part of the procedures prescribed in this guide.

Section 1	contains the scope of the guide.
Section 2	includes the referenced documents.
Section 3	has definitions of terms pertinent to this guide, terms used in this guide but defined in E1527, and acronyms.
Section 4	is directed at the significance and use of this guide.
Section 5	discusses the relationship between this guide and E1527.
Section 6	describes the <i>user's</i> responsibilities under this guide.
Sections 7 – 10	consist of the main body of the <i>VES</i> process, including evaluation and <i>report</i> preparation.
Section 11	provides information regarding non-scope considerations (see 1.3).
Appendix X1	provides legal background for vapor encroachment screening.

Appendix X2	provides guidance on suggested qualifications for the <i>environmental professional</i> conducting the VES.
Appendix X3	provides a sample questionnaire for the <i>environmental professional</i> to obtain pertinent information for the VES from the <i>property owner/operator/occupants</i> .
Appendix X4	provides a recommended table of contents and report format for the VES investigation when not incorporated into a <i>Phase I ESA</i> report.
Appendix X5	includes a listing of federal and state agency web sites that discuss vapor intrusion assessment policies and guidance.
Appendix X6	includes a list of <i>chemicals of potential concern</i> .
Appendix X7	provides general guidance for vapor intrusion assessment and mitigation.
Appendix X8	provides general guidance and references for data collection in the conduct of vapor intrusion investigations.
Appendix X9	provides a supplemental bibliography of federal and state vapor intrusion guidance and other publications that may assist the <i>environmental professional</i> conducting a VES or vapor intrusion assessment.

1.6 *This guide 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.*

1.7 *This guide cannot replace education or experience and should be used in conjunction with professional judgment. Not all aspects of this guide 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 guide be applied without consideration of a project's many unique aspects. The word "Standard" in the title means only that the guide has been approved through the ASTM consensus process.*

1.8 *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

E1527 Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process

E1903 Practice for Environmental Site Assessments: Phase II Environmental Site Assessment Process

2.2 Federal Statutes:

42 U.S.C. U.S. Code, Title 42, The Public Health and Welfare, Solid Waste Disposal, Identification and Listing of Hazardous Wastes, §6901, 6903, 6921; 42 U.S.C. U.S. Code, Title 42, Comprehensive Environmental Response, Compensation and Liability Act, 9605, 9601, *et seq.*

2.3 USEPA Documents:

40 CFR Title 40, Protection of Environment, Chapter 1, Environmental Protection Agency, Parts 300, 302, 312, 355, *et seq.*

OSWER Publication 9200.2-154, OSWER Technical Guide for Assessing and Mitigating the Vapor Intrusion Pathway

from Subsurface Vapor Sources to Indoor Air, June 2015
EPA 510-R-15-001, Technical Guide for Addressing Petroleum Vapor Intrusion at Leaking Underground Storage Tank Sites, June 2015

2.4 Other Documents:

NTP National Toxicology Program, "Annual Report on Carcinogens," (latest edition)

IARC International Agency for Research on Cancer "Monographs" (latest editions)

Pubchem, "Database of Toxic Effects of Chemical Substances" (<https://pubchem.ncbi.nlm.nih.gov>)

Vapor Intrusion Regulatory Guidance, <https://www.protect-environmental.com/vapor-intrusion-regulatory-guidance-by-state/>

3. Terminology

3.1 This section provides definitions and descriptions of terms used in this guide, terms used in this guide extracted from E1527 (some of which have been modified to be consistent with this guide), and a list of acronyms for keywords used in this guide. The terms are an integral part of this guide and are critical to an understanding of the guide and its use.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *approximate minimum search distance, n*—defined in subsection 8.1.3 and also defines the default *area of concern (AOC)*.

3.2.2 *aquifer, n*—rock or sediment in a formation, a group of formations, or part of a formation that is saturated and sufficiently permeable to transmit water to wells or springs.

3.2.3 *area of concern (AOC), n*—defined in subsections 8.1.2, 8.1.3 and 8.1.4 and is defined by the *approximate minimum search distance* adjusted as appropriate. When the AOC is defined by the *approximate minimum search distance* without adjustment, the AOC is the default AOC.

3.2.4 *biodegradation, n*—process by which microbial organisms transform or alter (through metabolic, enzymatic, or other action) the structure of chemicals present in the environment.

3.2.5 *chemical(s) of concern, COC, n*—chemical that is present in the subsurface environment, has a vapor pressure greater than 1 mm of mercury, or a Henry's Law Constant greater than 1×10^{-5} atm m³/mole at ambient temperature and pressure, and can potentially migrate as a vapor into the vadose zone of the TP.

3.2.5.1 *Discussion*—COC generally meet specific criteria for *volatility* (see 3.2.39) and *toxicity* (see 3.2.34) and include volatile organic compounds, semi-volatile organic compounds, petroleum hydrocarbons, and volatile inorganic analytes (such as mercury). A list of COC is presented in Appendix X6. A chemical's molecular weight has also been suggested as a criterion for volatility (with a threshold of 200 g/mole). However, EPA indicated in its June 2015 Vapor Intrusion Guidance that it is not considering a chemical's molecular weight because molecular weight is only a weak predictor of volatility. Those chemicals with a molecular weight greater than 200 g/mole are identified with an asterisk in Appendix X6.

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.