

Vapor Encroachment Screening Under the Newly-Revised ASTM E 2600-10 Standard

by

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Overview

- **Vapor encroachment and the vapor intrusion assessment process**
- **Confusion Created by E 2600-08**
- **Revisions Made to E 2600-08**
- **Capsule Summary of E 2600-10**
- **VEC Screening Under E 2600-10**
- **Implications for EPs Conducting Property Due Diligence**

Vapor Encroachment and the Vapor Intrusion Assessment Process

- (1) *Are there actually or is there a potential for volatile vapors to encroach upon the target property (TP)?***
(Addressed by ASTM E 2600-10)
- (2) *If so, can these volatile vapors migrate into structures on the property?***
(Addressed by Federal/State VI Guidance)
- (3) *If so, can they represent an indoor air quality problem?***
(Addressed by Federal/State VI Guidance)

**ASTM E 2600-08 was published in 2008,
but it created considerable confusion in
the marketplace...**

Capsule Summary of E 2600-08

- Published as a *standard practice* with four tiers
- First two tiers were **SCREENING TIERS** designed to identify if a potential vapor intrusion condition (pVIC) exists
 - **Tier 1 – focuses on known or suspect contaminated sites in AOC as identified in ASTM E 1527-05 Phase I investigation, i.e., government records investigation, historical research, etc. – primary and secondary AOC**
 - **Tier 2 – focuses on the contaminated plumes from any contaminated sites in AOC and their proximity (critical distance) to TP and COC concentrations or actual sampling to identify if vapors above state RSLs have encroached on the TP**

Capsule Summary of E 2600-08 cont'd

- **Tiers 3 and 4 were INFORMATIONAL TIERS**
 - *Tier 3 discussed the various approaches to assess whether a vapor intrusion condition (VIC) exists – the standard directs the user to follow appropriate and applicable government guidance and regulation*
 - *Tier 4 discussed general mitigation alternatives– the standard left selection of a mitigation alternative, if any, up to the EP and client*

Confusion in the Marketplace

- Is E 2600-08 a comprehensive vapor intrusion assessment standard or a screening standard?
- If it is just a screening standard, why is there so much discussion about vapor intrusion assessment and mitigation?
- What is the relationship with E 1527-05?
- Why does the standard draw conclusions inconsistent with the REC definition in E 1527-05, e.g., pVIC determination is NOT part of Phase I?
- If there is insufficient data to rule out a pVIC, why is a pVIC presumed to exist? Doesn't this create a stigma on a property?

Confusion in the Marketplace

- EPA and states have issued vapor intrusion policy as *guidance* in view of uncertainty surrounding the issue. Why was ASTM E 2600-08 published as a standard practice instead of a standard guide?
- Is it really necessary to have the secondary area of concern in Tier 1 as experience suggests it is not necessary and may waste considerable time investigating sites much too far from the TP?
- If a pVIC is identified, the pVIC term infers that there may be a potential indoor air quality problem which can unjustifiably create concern, potential liability and stigma. The words “vapor intrusion” are causing the problem in this term. Isn't there a better term that can be used?

Major Revisions Made for E 2600-10

- The document was changed from a *standard practice* to a *standard guide*. It is still a standard, but allows more flexibility to EP.
- The title of the standard was changed to “*Standard Guide for Vapor Encroachment Screening on Property Involved in Real Estate Transactions.*”
- The document was refocused and redirected solely at the likelihood for migrating vapors to encroach upon a target property (*creating a vapor encroachment condition or VEC*). Whether or not encroaching vapors result in a vapor intrusion problem requires further investigation that is beyond the scope of the standard. As such, all references to pVICs and VICs have been eliminated as have references to vapor intrusion assessment and mitigation.

Major Revisions Made for E 2600-10 cont'd

- The objective of the revised standard is simply to *identify VECs*, analogous to the identification of RECs in ASTM E 1527
- The only findings from the screening are:
 - *a VEC exists or is likely to exist, or*
 - *can be ruled out because it does not exist or is not likely to exist*
- Whether or not a VEC represents a REC in a Phase I is left to the environmental professional's judgment.
- An entirely new Legal Appendix was prepared focusing solely on the relationship with E 1527-05 and AAI

Major Revisions Made for E 2600-10 cont'd

- The secondary AOC in Tier 1 was eliminated
- Since the risk based concentration (*RBC*) test (for COCs in a nearby contaminated plume) is directly associated with vapor intrusion assessment, it was eliminated from Tier 2
- Section 10 (*Tier 3: VIC Assessment*) and Section 11 (*Tier 4: Mitigation*) were *re-located to the Appendix* as they have nothing to do with the screening methodology

Major Revisions Made for E 2600-10 cont'd

- All *presumptions* that vapors are encroaching upon the TP or that there may be a vapor intrusion problem when there is insufficient data to make such a judgment were *eliminated*
- The *user's responsibilities* section was *modified* so as not to impact any contractual relationship between buyers and sellers

Capsule Summary of the ASTM E 2600-10 Standard

- **Two levels of screening for VECs**
 - **Tier 1 – focuses on known or suspect contaminated sites in AOC (*primary only*) as identified in ASTM E 1527-05 Phase I investigation, i.e., government records investigation, historical research, etc.**
 - **Tier 2 – focuses on the contaminated plumes from any contaminated sites in AOC and their proximity (critical distance) to TP or actual sampling to identify if vapors have encroached on the TP (*no RBC test*)**

New ASTM Terminology

- *Vapor Encroachment Condition*
- *Area Of Concern*
- *Critical Distance*

Vapor Encroachment Condition (VEC)

“presence or likely presence of COC vapors in the subsurface of the TP caused by the release of vapors from contaminated soil or groundwater either on or near the TP”

Area of Concern (AOC)

- ***Measured from TP boundary to known or suspect contaminated property***
- ***1/3rd mile for known or suspect contaminated sites with Chemicals of Concern (volatile/semi-volatile hazardous substances)***
- ***1/10th mile for known or suspect contaminated sites with Petroleum Hydrocarbon Chemicals of Concern***
- ***May be reduced in cross-gradient and down-gradient directions if groundwater flow direction is known***

Critical Distance

- **defined as the distance from the *nearest edge of contaminated plume* to the *nearest TP boundary***
- **measured linearly in *any direction* , e.g., horizontal, vertical, etc.**
- ***100 ft for COC***
- ***30 ft for dissolved volatile petroleum hydrocarbons***
- ***100 ft for petroleum LNAPL accumulating above the water table (“free product”)***

VEC SCREENING METHODOLOGY

Tier 1 – Initial Screening for VECs

- **Designed as a screening step to supplement a Phase I – *relies on all the information already collected in Phase I investigation***
- **Review of government and historical records at specific search distances to identify COC-contaminated properties within the Area of Concern (AOC):**
 - ***1/3rd mile for known or suspect contaminated sites with Chemicals of Concern (volatile/semi-volatile hazardous substances)***
 - ***1/10th mile for known or suspect contaminated sites with Petroleum Hydrocarbon Chemicals of Concern***

Most Prevalent Sources of Concern

- Present and former gas station sites
- Present and former dry cleaner sites
- Present and former industrial sites, particularly those using chlorinated solvents for degreasing and parts cleaning
- Former manufactured gas plant sites
- Former hazardous waste disposal sites
- Present and former garbage landfills

Tier 1 AOC when Groundwater Flow Direction CAN be Estimated

■ **Up-gradient**

- 1/3 mile for COC sources
- 1/10 mile for petroleum hydrocarbon sources

■ **Down-gradient**

- 100' COC Sources/Petroleum Hydrocarbon LNAPL sources
- 30' Dissolved Petroleum Hydrocarbon Sources

■ **Cross-gradient**

- 100' COC Sources/Petroleum Hydrocarbon LNAPL sources + Plume Width Consideration
- 30' Dissolved Petroleum Hydrocarbon Sources + Plume Width Consideration

Net Reduction in AOC for Tier 1 Screening of Known or Suspect COC SOURCES

E 2600-10 w/

<u>Source Location</u>	<u>E 2600-10</u>	<u>Buonicore Methodology*</u>
Up-gradient	1,760'	1,760'
Down-gradient	1,760'	100'
Cross-gradient	1,760'	365'

* *Buonicore, A.J., Screening for Potential Vapor Intrusion Problems, Paper #129, Proc. AWMA 102nd Annual Conference, Detroit, MI, June 16-19, 2009.*

Net Reduction in AOC for Tier 1 Screening of *Known or Suspect PHC SOURCES*

<u>Source Location</u>	<u>E 2600-08</u>	<u>E 2600 Revised w/ Buonicore Methodology*</u>
Up-gradient	520'	520'
Down-gradient	520'	100' (LNAPL) 30' (dissolved)
Cross-gradient	520'	165' (LNAPL) 95' (dissolved)

* Buonicore, A.J., Screening for Potential Vapor Intrusion Problems, Paper #129, Proc. AWMA 102nd Annual Conference, Detroit, MI, June 16-19, 2009.

EP Judgment

- *Type target property*
- *Location of contamination source*
- *Cleanup Status of Contaminated Site*
- *Depth to Groundwater*
- *Soil Characteristics*
- *Presence of “Vapor Conduits”*
- *Presence of Hydraulic or Physical Barriers*

Tier 1 VEC Screening Summary

- **Conclusions:**
 - **VEC exists or likely exists**
 - **VEC can be ruled out because it does not exist or is not likely to exist**
- **If a VEC exists or is likely to exist, EP and user to decide what further investigation (such as proceeding to Tier 2), if any, is warranted**

Tier 2 – More Refined Screening

Non-invasive

- If Phase II data on contaminated source exists, the proximity of the contaminated plume to the TP is evaluated
- Plume Test/Critical Distance Evaluation

Tier 2 – More Refined Screening cont'd

Invasive

- If Phase II data on contaminated source does NOT exist, or
- If a preferential pathway exists (natural or man-made), or
- If VEC is identified in Tier 1 and want to do confirmatory sampling, or
- If client more comfortable with sampling
- Sampling can be conducted at TP boundary to identify if vapors are encroaching upon the TP
- Plume Test/Critical Distance Evaluation

Tier 2 VEC Screening

- **Conclusions:**
 - **VEC exists or is likely to exist**
 - **VEC can be ruled out because it does not exist or is not likely to exist**
- **EP conducting the Phase I will need to determine if the VEC constitutes a REC**
- **If a VEC exists or is likely to exist, EP and user decide what further investigation, if any, is warranted**

Some Alternatives If a VEC exists...

- Client may choose to proceed to vapor intrusion assessment following applicable federal/state guidance/policy
- Client may choose to do more extensive soil gas/groundwater testing on the property
- Client may choose to proceed directly to pre-emptive mitigation (assuming it will be more cost effective)
- Client and EP may choose to proceed in some other direction

Implications for EPs Conducting Property Due Diligence

- Vapor migration (analogous to groundwater migration) must be considered in an ASTM E 1527-05 Phase I ESA
- If screening indicates a VEC and the screening is performed as part of a Phase I, EP needs to decide if VEC constitutes a REC
- E 2600-10 provides the EP with a methodology to conduct a screen for vapors migrating on or to the target property
- Vapor intrusion into a building and the subsequent impact on indoor air quality is not part of the ASTM E 2600-10 scope of work