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

by

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ABSTRACT

The ASTM E 2600-08 vapor intrusion assessment standard for properties involved in real estate transactions, first published in March 2008, was substantially revised this past Spring and published as ASTM E 2600-10. This paper is directed at the revisions, what they are, why they were necessary and what they mean for environmental professionals conducting property due diligence in real estate transactions.

The revised standard focuses solely on screening for the likelihood of migrating vapors volatilized from a contaminated source to encroach upon the subsurface of a property involved in a real estate transaction and create a vapor encroachment condition (VEC). Two tiers for screening are included in the practice. The first tier is based upon the existence of known or suspect contaminated sites in the area. The second tier is more comprehensive and investigates specific characteristics associated with the contaminated plumes from these sites, or if no plume information is available, relies on sampling. If the likelihood exists for vapors to reach the subsurface of the property, further investigation that is beyond the scope of this practice would be necessary to determine if intrusion is occurring into any buildings on the property.

It is anticipated that the screening under ASTM E 2600-10 will become a routine part of a Phase I environmental site assessment.

INTRODUCTION

Vapor migration and intrusion into structures on a property can potentially create significant liability and have a material impact on property value. As such, it is a growing concern for property owners, prospective purchasers of property and environmental professionals conducting due diligence.^(1,2) To respond to this industry concern, in June

2010, ASTM published *E 2600-10, Standard Guide for Vapor Encroachment Screening on Property Involved in Real Estate Transactions.*⁽³⁾

RATIONALE FOR REVISING THE STANDARD

The original E 2600-08 standard was published by ASTM in March 2008. After more than a year's use in the marketplace, it became clear that the standard created a considerable amount of confusion. For example, there was confusion over whether the standard was a vapor intrusion assessment standard or a vapor intrusion screening standard. There was confusion over why the standard discussed vapor intrusion assessment and mitigation if these were only provided "for informational purposes." There was confusion over whether or not the standard should be part of an ASTM E 1527 Phase I environmental site assessment,⁽⁴⁾ and why, if there was insufficient data to rule out a potential vapor intrusion condition, it was presumed to exist. The standard also found considerable resistance in the legal community where it was believed the standard may have overstepped its bounds and drew legal conclusions (such as vapor migration onto a property being defined in the standard as outside the scope of a Phase I). The end result of all this confusion in the marketplace had a detrimental impact on the standard's adoptability and necessitated revisions be made.

REVISIONS

To resolve the confusion created in the marketplace by the standard, a number of substantial revisions were made. These were balloted in March-April 2010 and the result was a revised standard, E 2600-10, published by ASTM in June 2010. Experience to-date suggests the newly revised standard has been able to eliminate most of the confusion that existed resulting in its adoption much more readily by government agencies (such as HUD), lenders and prospective purchasers of real estate.

The revised standard has been re-focused solely on screening for the likelihood of volatile vapors to encroach upon or otherwise reach a property involved in a real estate transaction (thereby creating a Vapor Encroachment Condition or VEC). The title of the standard was also changed to better reflect this approach.

The revised standard has been issued as a standard guide, rather than a standard practice, to give the environmental professional conducting the screening greater flexibility, particularly in view of the considerable uncertainty that still exists in vapor migration assessment. This "guidance" approach has been used by EPA, DOD and virtually all government agencies that have addressed vapor intrusion.

A new legal appendix is included in the revised standard to clarify the relationship with ASTM's E 1527-05 Phase I standard.

TIER 1 SCREENING UNDER E-2600-10

The only significant difference between Tier 1 screening in the revised standard as compared to the methodology in the previous E 2600-08 standard is that the secondary area of concern (AOC) was eliminated in E 2600-10. This was done because experience had demonstrated that including the secondary AOC wasted time and money investigating contaminated sites a considerable distance from the target property and which were unlikely to impact it from a vapor migration viewpoint.

The information required for Tier 1 screening in E 2600-10 is essentially the same information collected as part of an ASTM E 1527 Phase I. The first check in the screening process is a search distance test to identify if there are any known or suspected contaminated sites with chemicals of concern (COC) within the AOC. If there are none, no further action is required.

Search distances are different for sites contaminated with [non-petroleum hydrocarbon] COC, such as chlorinated volatile organics, versus sites contaminated with petroleum hydrocarbon COC. Search distances are shorter for petroleum hydrocarbons because they are known to undergo significant bio-degradation in the presence of oxygen.

To identify the AOC for contaminated sites with [non-petroleum hydrocarbon] COC, the search radius is 1/3 mile around a target property (TP). For sites with petroleum hydrocarbon COC, the search distance is 1/10 mile around a TP. Hence, for example, a gas station site with a release would be in the AOC if the gas station was located anywhere within 1/10 mile of the TP. The AOC search distances were determined based upon conservative consideration of both plume lengths and the distances vapors volatilized from contaminated plumes might travel along a path of least resistance in relatively permeable soil from a source (such as contaminated groundwater) through the vadose zone directly to a TP.

If a known or suspected contaminated site with COC is located in the AOC, the next check typically would be to determine if there is a hydraulic or physical barrier between the TP and the contaminated site. For example, if there is a river between the contaminated site and the TP, the river may act as a hydraulic barrier to any migrating contaminant vapors. The same may be true if a clay barrier or fresh water lens exists in the sub-surface that would block migrating vapors. If such a barrier exists, the known or suspected contaminated site in the AOC may be eliminated from concern.

If a physical or hydraulic barrier does not exist, then the possible existence of major man-made or natural preferential pathways between the contaminated site and the TP must be evaluated. Natural preferential pathways may include, for example, fractured bedrock or karst terrain. Man-made pathways may include, for example, major utility corridors or sewer lines. If such significant preferential pathways do exist, then proceeding directly to invasive sampling (e.g., soil gas sampling) under Tier 2 may be necessary to determine if vapors have impacted the TP.

If there are no major preferential pathways between the contaminated site and the TP, then the location of the contaminated site relative to the TP becomes important. If the

contaminated site is located up-gradient of the TP, there is much greater concern than if it is located down-gradient or cross-gradient. To understand why, it is necessary to understand the definition of “critical distance” (CD) in the standard. Effectively, the critical distance is the maximum distance a vapor can reasonably be expected to migrate through soil in the vadose zone assuming that the path of least resistance is directly from the nearest edge of the contaminated media such as groundwater or soil to the nearest boundary of the TP.

The standard specifies a CD for both [non-petroleum hydrocarbon] COC and petroleum hydrocarbon COC. For petroleum hydrocarbon COC, critical distances are specified for both LNAPL (“free product” sitting above the water table) and dissolved petroleum hydrocarbon situations. If the CD is less than 100 feet (except for dissolved petroleum hydrocarbon COC in which case the CD is shorter: less than 30 feet), then migrating contaminant vapors can potentially impact the TP. If the CD is greater than or equal to 100 feet (or 30 feet for dissolved petroleum hydrocarbon COC), then it is unlikely migrating contaminant vapors will impact the TP. The CD for petroleum hydrocarbon COC in LNAPL or “free product” phase is the same as for [non-petroleum hydrocarbon] COC (i.e., 100 feet).

If a contaminated site is located down-gradient from the TP, it generally can be eliminated from concern if it is beyond the CD. If the contaminated site is cross-gradient, it generally can be eliminated if it is beyond the CD plus an additional distance to account for the width of the plume. A conservative methodology for estimating plume width for use in this standard has been proposed by Buonicore.⁽⁵⁾ If the contaminated site is up-gradient of the TP or there is COC contamination on the TP, then further investigation is required.

The environmental professional may be able to eliminate a contaminated site from further consideration using experience with local subsurface geology and soil characteristics. For example, if the overlaying soil is highly impermeable clay, this may eliminate the source of contamination from concern, depending on its location. Or if there is a fresh water lens located above the contaminated groundwater plume, this could eliminate the source from concern.

The conclusion from Tier 1 screening is that a VEC exists or is likely to exist, or that it can not be ruled out, or that it can be ruled out because it does not exist or is unlikely to exist. If a VEC exists, is likely to exist or can not be ruled out, the client and the environmental professional must decide if further investigation, such as proceeding to Tier 2, is warranted. A user may, for example, decide alternatively to proceed preemptively to mitigation.

TIER 2 SCREENING UNDER E 2600-10

The only significant difference between Tier 2 screening in the revised standard as compared to the methodology in the previous E 2600-08 standard is that the risk-based concentration (RBC) test was eliminated. In this test, the concentration of the COC is

compared to the state (or federal) risk screening level (RSL). If below the RSL concentration, vapor intrusion is judged to not likely present a problem. The RBC test was eliminated because it goes beyond screening (which is the sole purpose of the revised ASTM standard) and is better associated with vapor intrusion investigation. For example, if a VEC exists as a result of the screening, further investigation (beyond the scope of the revised ASTM standard) might be to conduct an RBC test.

Tier 2 screening consists of a non-invasive or invasive investigation, depending upon the availability of contaminated plume data associated with the contaminated site creating the VEC identified in Tier 1. If contaminated plume data is available in state regulatory files or elsewhere that can provide insight into the extent of contamination associated with the source and the status of any remediation, then the non-invasive screening methodology can continue by assessing whether the contaminated plume edge nearest the boundary of the TP is within or beyond the CD.

If no plume information is associated with the source of contamination (or if there are preferential pathways), then it may be appropriate to evaluate whether or not invasive sampling (e.g., soil gas and/or groundwater sampling at or near the TP) is a viable option. Sampling should not be pursued unless it is believed that useful information can be collected. If sampling is conducted, the results may be used to determine if a VEC exists or is likely to exist, or that it can not be ruled out, or that it can be ruled out because it does not or is unlikely to exist.

If a VEC exists or is likely to exist or can not be ruled out after the Tier 1 and Tier 2 screening, the client and environmental professional must decide on what further investigation, if any, is appropriate.

RELATIONSHIP BETWEEN E 1527-05 AND E 2600-10

The purpose of the E 1527-05 Phase I standard is to identify recognized environmental conditions (RECs) that may be associated with a property involved in a real estate transaction. The standard⁽⁴⁾ defines a REC as the “presence or likely presence of any hazardous substances or petroleum products on a property under conditions that indicate an existing release, a past release or a material threat of a release...into structures on the property, or into the ground, groundwater or surface water of the property.” The ASTM standard is driven by CERCLA where the definition of “release” includes “emitting” and “escaping” into the “environment.”⁽⁶⁾ Moreover, courts have included costs for investigation and remediation of hazardous substance vapors as potentially recoverable response costs under CERCLA. Finally, EPA’s 2002 draft vapor intrusion guidance document⁽⁷⁾ was developed for use at CERCLA, RCRA corrective action and brownfield sites.

EPA has stated that the ASTM E 1527-05 standard meets the “all appropriate inquiry (AAI)” investigation established by their regulation. In the AAI rule,⁽⁸⁾ the environmental professional must provide “an opinion as to whether the inquiry has identified conditions

indicative of releases or threatened releases of hazardous substances...on, at, in, or to the subject property.”

In view of these considerations, it is clear that vapor migration onto a property involved in a real estate transaction should be evaluated in a Phase I investigation. The E 2600-10 standard provides a methodology to accomplish this. If a VEC exists under E 2600-10 conducted in conjunction with an E 1527-05 Phase I, then the environmental professional will also need to determine if the VEC is a REC under E 1527-05. For example, if the depth to contaminated groundwater or the distance between the edge of a contaminated plume and the nearest structure on the property is greater than the critical distance, then it is unlikely a VEC would be considered a REC. Rather it would likely be viewed as “de minimis” under the REC definition. Also, if the concentration of the volatile contaminant in the contaminated plume is less than the state’s risk screening level (commonly established in state vapor intrusion guidance), it is unlikely a VEC would be considered a REC.

If the environmental professional determines that the VEC is a REC, then it is likely a client will ask the consultant for a recommendation on what further investigation, if any, might be appropriate. Such further investigation is beyond the scope of E 2600-10. Most consultants would likely follow the state’s vapor intrusion guidance document or policy, assuming one exists. Alternately, clients may choose to proceed pre-emptively to mitigation.

STAKEHOLDER CONCERNS ADDRESSED

The E 2600-10 standard resolves a number of concerns registered by current and prospective property owners.

- (1) The standard establishes a prescriptive screening methodology that may be used to evaluate vapor encroachment onto a property and this methodology may be used in conjunction with ASTM E 1527-05.
- (2) Vapor encroachment screening can avoid potential future investigation expenses that may be required after a property is acquired should state regulators become concerned about potential vapor intrusion issues.
- (3) Property owners/operators/managers will be able to provide a safer working environment for employees/tenants by screening for vapors that may encroach upon the property.
- (4) Future liability, including potential toxic tort litigation, arising from tenant vapor intrusion suits or other third party vapor intrusion suits, can be avoided.
- (5) Property stigma, with consequent property devaluation, due to vapor intrusion may be avoided.

The standard resolves a number of environmental consultant concerns.

- (1) The standard establishes a prescriptive screening methodology that may be used to evaluate vapor encroachment onto a property and this methodology may be used in conjunction with ASTM E 1527-05 in making a REC determination.
- (2) Litigation related to vapor intrusion may be avoided.

The standard resolves a number of attorney concerns.

- (1) The standard establishes a prescriptive screening methodology that may be used to evaluate vapor encroachment onto a property and this methodology may be used in conjunction with ASTM E 1527-05.
- (2) If the attorney desires to have an AAI-compliant Phase I, it must include evaluation of vapors that may encroach upon a property (under the REC definition in E 1527-05) to maintain all available defenses to CERCLA liability.

The standard resolves a number of lender concerns.

- (1) An adverse impact on the property used as collateral and its value can be avoided.
- (2) A potential negative impact on the borrower's creditworthiness and ability to repay the loan can be avoided.
- (3) Potential foreclosure complications to deal with a vapor intrusion problem can be avoided.

Finally, the standard resolves a number of insurance company concerns

- (1) Pro-active VEC screening by the insurance industry may avoid re-opener policy claims at closed (no further action) sites re-opened by regulatory agencies to investigate potential vapor intrusion problems.
- (2) There may be fewer claims related to vapor intrusion against property pollution liability (PPL) policies.
- (3) There may be fewer E&O claims against policies held by environmental consultants for missing a vapor intrusion problem.
- (4) There may be less toxic tort litigation related to vapor intrusion.

IMPLICATIONS FOR ENVIRONMENTAL PROFESSIONALS

Environmental professionals conducting a Phase I today have two choices on how to deal with vapors that may encroach upon a property involved in a real estate transaction. They can either: (1) exclude it from the Phase I scope of work (which may make the Phase I non-AAI-compliant because the REC definition in AAI-compliant E 1527-05 considers vapors encroaching upon a property); or (2) include it as part of the Phase I. If it is included, the ASTM E 2600-10 vapor encroachment screening standard provides prescriptive methodology that may be followed to determine the likelihood of migrating

vapors volatilized from contaminated soil or groundwater to encroach upon the target property.

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- (8) 40 CFR 312.11 (C)(I).

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