

Vapor Intrusion Risk Pathway: Regulatory Updates

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This presentation is an excerpt from the vapor intrusion training that Dr. Hartman has been presenting to Federal & State regulatory agencies, DOD facilities, consulting groups, and stakeholders around the country. As of January 2011, this training has been given to over 30 State Regulatory agencies, including ASTSWMO and the State Coalition of Dry Cleaners. Training has also been given to many PRPs such as the major oil companies, Armed Services, & EPRI.

Lecture notes are at the bottom of each slide so that if played out as a hard-copy, the presentation can be a useful reference document.

Review of VI Guidances

- EPA OSWER
- EPA-OUST
- CA Agencies
- CA-Low Risk Closure Policy
- ITRC Guidance
- ASTM Screening Standard

If you are a consultant or RP, you need to know which agency has jurisdiction and what their vapor intrusion policy is in order to know what approaches are allowed and what the allowable levels are.

EPA-OSWER Draft Guidance

- Tier 1: **Primary** Screening
 - Q1: VOCs present?
 - Q2: Near buildings?
 - Q3: Immediate concern?

- Tier 2: Secondary Screening
 - Q4: Generic screening
 - Q5: Semi-site specific screening (alphas from charts & tables)

- Tier 3: Site-Specific Pathway Assessment
 - Q6: Indoor air (and/or subslab)

The current EPA draft VI guidance consists of 3 tiers, consisting of 6 questions. Tier 1 is essentially a screening survey asking basic questions such as whether volatile compound contamination exists and whether buildings exist.

Tier 2 consists of 2 questions/steps: Q4 & Q5. Question 4 is so restrictive (i.e., very low screening levels) that just about every site is sucked in, similar to a vortex or hopper. Question 5 allows more sampling options, is not as conservative, and may be the best tier/question to work within.

Tier 3, question 6, allows for only two investigatory methods, indoor air or sub-slab soil gas, and has very restrictive (i.e., very low screening levels) criteria. Once at this level, it is extremely hard to get out and requires expensive and repeated sampling.

Newest Changes (2012?) EPA OSWER VI Guidance

- **Tier 1: Primary Screening**
 - Q1: VOCs present?
 - Q2: Near buildings?
 - Q3: Immediate concern?
- **Tier 2: Source Screening**
 - Generic screening using near-source samples
- **Tier 3: Pathway (Building) Assessment**
 - Multiple lines of evidence (sg & gw)
 - Sub-slab & Indoor Air Data

The changes currently being considered by the EPA would make the vapor intrusion pathway even more stringent. Few sites would screen out and indoor sampling (sub-slab or indoor air) is required in most cases.

Guidance Updates

- Fed EPA (OSWER & Superfund)
 - Moving to sub-slab & indoor air
 - 7 to 30 day indoor air sampling period
 - Att factor of 0.1 for SG & 0.001 for GW
 - Modeling no longer an exit
- EPA-OUST: Guidance for HCs by 2012
 - Exclusion criteria by July 2011?
 - Testing of Biovapor model
 - FAQ by April 2011
 - Summary of State Guidances by April 2011

Here are some of the proposed changes to the EPA-OSWER (Office of Solid Waste & Emergency Response) guidance, due out in November 2012.

Meanwhile, EPA-OUST (Office of Underground Storage Tanks) is coming out with their own guidance for petroleum hydrocarbons also in November 2012.

Allowable Benzene in GW 1e-6 risk

- New OSWER Guidance:

$$0.31 \text{ ug/m}^3 / 0.001 = 0.31 \text{ ug/L} / 0.2 = 1.5 \text{ ug/L}$$

- CA-LUFT Exclusion Value: 1000 ug/L

~700 times lower than database suggests!!

Based upon the proposed new EPA OSWER guidance, allowable levels for benzene in groundwater will be ~700 times lower than actual site data suggest should be levels of concern.

CA Agencies

- CA-DTSC (& LA-RWQCB)
 - Soil Gas, VI, & Mitigation “Advisory”
 - CHHSLs (thanks to OEHHA)
- EPA Region 9
 - Follows the EPA Draft VI Guidance
 - Adopted Region 3 Screening Levels
- SF-RWQCB
 - ESLs include aliphatics!

Here is a summary of the vapor intrusion policy/guidances for some California regulatory agencies. DTSC has soil gas collection & analytical guidance document, a vapor intrusion guidance document, and recently issued a mitigation document. The San Francisco Water Board has issued their own ESLs. The Central Valley & some Bay Area agencies are requiring residential criteria at all sites, whether current use is commercial or residential, to avoid hassles of deed restrictions and future monitoring of property use.

Proposed DTSC Changes

- Preference for Sub-slab Samples
- Collect Exterior SG Samples At Source
- Repeated Sampling of Soil Gas
- Preference for Gaseous Tracers
- Raising Sub-slab AF to 0.05 (5x stricter)
- A Decision Matrix??

DTSC Defer to LUFT Manual for Petroleum HCs?

Some changes DTSC proposed in their forums in June 2009

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ESL Update

(as of 1/27/11)

The San Francisco Bay region is not about to lower the ESL. The proposed ESL update would change the screening levels for a number of constituents and media/concerns (some up, some down) but the most significant change would be to the groundwater and soil gas screening levels for the vapor intrusion concern.

The proposed changes are based on a shift from model-based to empirically-based attenuation factors (and the USEPA database of empirically-derived attenuation factor) and would result in a 2-3 order of magnitude drop in those screening levels.

With respect to petroleum constituents, we will be recommending use of the State Board's LUFT Manual approach to addressing vapor intrusion at LUFT sites (versus using the ESLs in this context), so that biodegradation is explicitly considered.

Update on planned changes to the SF-RWQCB ESLs

LUFT Manual VI Sections

- Vapor Phase Fate & Transport (p. 62)
- Vadose Zone Attenuation Factors (p. 63)
- Soil Vapor Investigation (p.111)
- Soil Vapor Analysis (p.128)
- Risk/Site Screening Tool (p. 138)
- Appendix C – Vapor Intrusion

ITRC has recently finished it's vapor intrusion guidance document. It consists of 2 documents: A practical guideline and a separate scenarios document. A 2-day classroom training course will be held at 3 locations in the US in 2010.

From New CA-LUFT

Based on these studies, a LUFT site is assumed to present no unacceptable risk from vapor intrusion if site conditions indicate that there is :

- *Dissolved* groundwater concentrations below 1000 micrograms per liter (ug/L) for benzene and 10,000 ug/L for TPH and 5' from receptor.
- Free product is 30 or more from receptor

Under these conditions, it is assumed that natural attenuation is sufficient to mitigate concentrations

CA State Water Boards are proposing to adopt the exclusion criteria in their new LUFT manual.

VI Risk Screening Tool (LUFT Manual p.138)

A LUFT site is assumed to present no unacceptable risk from vapor intrusion if the following conditions are met:

- *Dissolved* groundwater concentrations <1000 (ug/L) for benzene and <10,000 ug/L for TPH and 5' of clean soil to receptor.
- *Dissolved* groundwater concentrations >1000 (ug/L) for benzene and >10,000 ug/L for TPH and 10' from receptor.
- Free product is 30' or more from receptor

CA State Water Boards are proposing to adopt the exclusion criteria in their new LUFT manual.

Definition of Clean Soil (p.138)

- In the unsaturated zone, clean soil is defined as TPH concentrations less than 100 mg/kg or oxygen present concentrations >4%.

Under these conditions, it is assumed that natural attenuation is sufficient to mitigate Concentrations of volatile petroleum constituents

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Soil Gas Allowed Levels

Benzene in Soil Gas, Residential Receptor, 1-6 Risk

	RBC (ug/m ³)
CHHSL	37
DTSC – Step 5	42
SF-ESL (subslab)	0.6
CA Low-Risk Policy	85,000

This table compares the different screening levels given by the three approaches. You can see that the lookup values are lowest (most conservative) and the values from the J-E model the highest (least conservative).

ITRC VI GUIDANCE

- Practical How-to Guide
- Stepwise Approach
- Investigatory Tools (Toolkit)
- Thorough Discussion of Mitigation
- Scenarios Document
- Three Training Dates in 2011

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The Net Widens: ASTM VI Standard

- Focus on Property Transactions
- Prescriptive Screening Distances
- No RBSLs (RBC)
- No Assessment Recommendations
- Released March 3, 2008
- Revised June 2010

ASTM convened a technical workgroup in 2005 to write a standard for vapor intrusion as it applies to property transactions. The standard was released on March 2008 & revised in June 2010.

ASTM VI Standard

Vapor Intrusion Condition (VIC) is defined as “the presence or likely presence of any volatile chemical of concern in existing or planned structures on a property resulting from an existing release or a past release from contaminated soil or groundwater on the property or within close proximity to the property, at a concentration that presents or may present a human health risk.”

The Standard defines a new term/acronym: the Vapor Intrusion Condition.

Liability Concerns

- Phase I Environmental Consultant
- Prospective/Current Property Owner
- Property Lender
- Property Insurer

Liability concerns is a big part of vapor intrusion. Those at risk include consultants, property owners (past, current & future), lenders, and insurance companies.

Want to Know More?

- ITRC 2-day VI Training 2011
 - October 3 & 4: Denver
- AEHS Conf – San Diego, March 2012
 - EPA all day workshop
 - Petroleum VI all day presentations
 - Half-day session on non-petroleum VI

Upcoming vapor intrusion training.

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