

# Vapor Intrusion Developments

Presented by Lawrence W. Falbe, Esq.

November 1, 2016



**Midwest Environmental  
Compliance Conference**

# Introduction

In his *Lettres Provinciales*, the French philosopher and mathematician **Blaise Pascal** famously wrote:



*I would have written a shorter letter,  
but I did not have the time.*

# Premise

**“Identifying and managing risks associated with vapor intrusion has been mainstreamed.”**

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# Premise

- “Identifying and managing risks associated with vapor intrusion has been mainstreamed.”
- Answer: **Mostly True**
- ***But*** vapor intrusion issues and concepts are still fluid (gaseous?) and evolving...and not well understood in the regulated community.



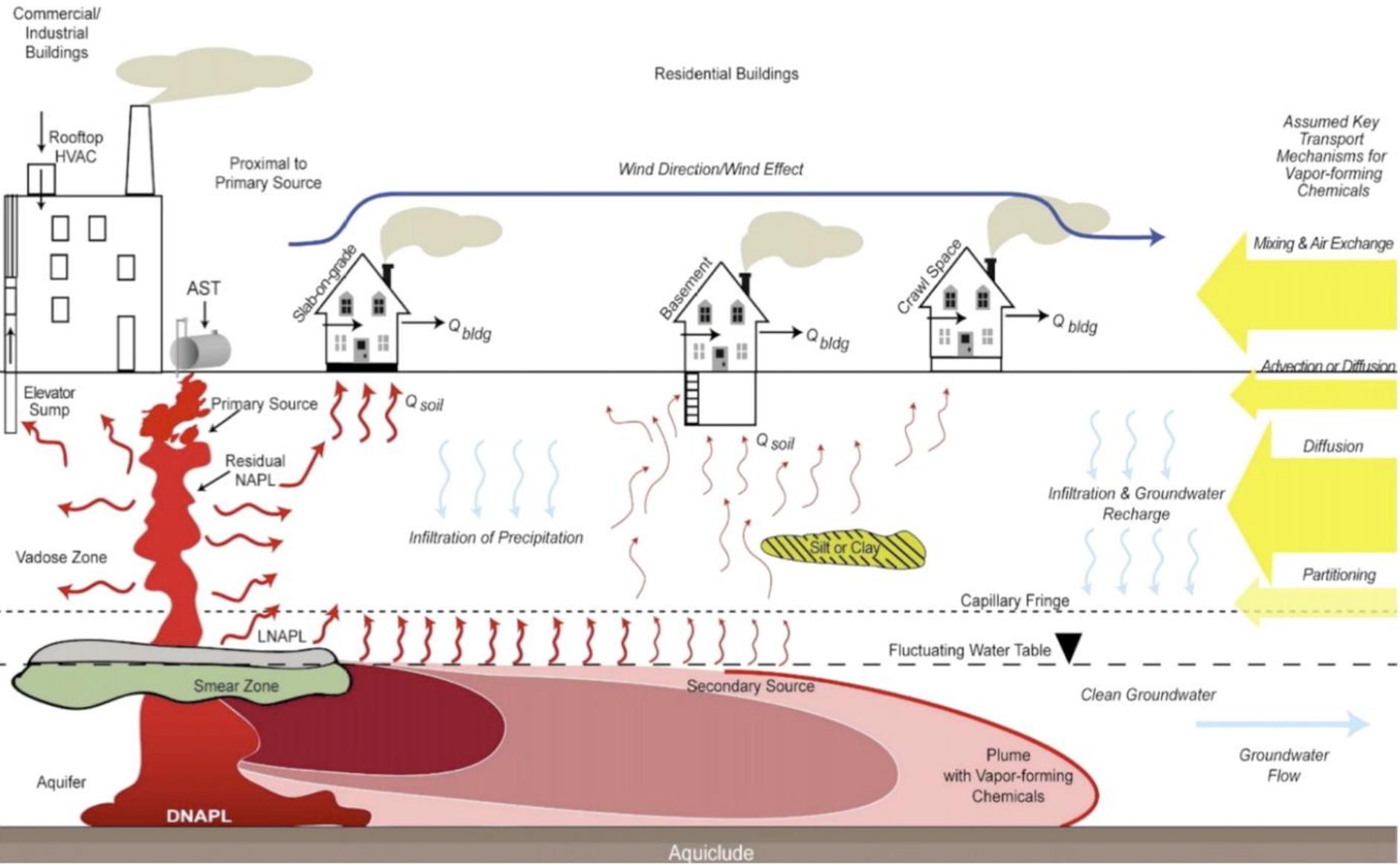
# Vapor Intrusion Defined

- Vapor intrusion is the migration of volatile chemicals from the subsurface into overlying buildings. Volatile chemicals in contaminated soil and/or groundwater can emit vapors that may migrate through subsurface soil and into air spaces of overlying buildings.
- Vapors can accumulate in dwellings or occupied buildings to levels that may pose short-term or long-term safety hazards, and/or health effects.
- Average person drinks 2 liters of water per day
- BUT – the Average person inhales 20,000 liters of air a day

# Vapor Intrusion Defined

- Vapors can enter buildings through cracks in basements and foundations, as well as through conduits and other openings in the building envelope. Also, they can enter structures that are not intended for human occupancy (e.g., sewers, drain lines, access vaults, storage sheds, pump houses) through cracks and other openings.
- All types of buildings, regardless of foundation type (e.g., basement, crawl space, slab-on-grade) have openings that render them potentially vulnerable to vapor intrusion.
- Vapor intrusion is a potential **human exposure pathway** -- a way that people may come into contact with hazardous vapors while performing everyday indoor activities.

# Conceptual Site Model (CSM)



# Vapor Intrusion Defined

In order for the vapor intrusion exposure pathway to be **complete**, the following criteria must be met :

- A subsurface source of vapor-forming chemicals is present (e.g., in the soil or in groundwater) underneath or near one or more buildings;
- Vapors form and have a route along which to migrate (be transported) toward the buildings;
- The buildings are susceptible to soil gas entry, which means openings exist for the vapors to enter the building and driving 'forces' (e.g., air pressure differences between the building and the subsurface environment) exist to draw the vapors from the subsurface through the openings into the buildings;
- One or more vapor-forming chemicals comprising the subsurface vapor sources are present in the indoor environment; and
- The buildings are occupied by one or more individuals when the vapor-forming chemicals are present indoors.

# Health Risks

A complete vapor intrusion pathway indicates that there is an opportunity for human exposure, which warrants further analysis:

- Chronic or long-term exposure
- **Acute (short-term) exposure**
- Different action levels for cancer and non-cancer risks
- TCE (and other volatile industrial chemicals)
  - In 2011, USEPA stated that TCE is a human carcinogen (previously, a “possible” carcinogen)
  - Relation to fetal heart damage and birth defects in first trimester?
- While traditionally the focus has been on adverse impacts based on long-term exposure, more recently, acute exposures have become more concerning and some agencies have defined an **urgent action level**. (see, e.g., Region 9 guidance)



## PUBLIC HEALTH STATEMENT Trichloroethylene

Division of Toxicology and Human Health Sciences

October 2014

This Public Health Statement is the summary chapter from the Toxicological Profile for trichloroethylene. It is one in a series of Public Health Statements about hazardous substances and their health effects. A shorter version, the ToxFQAQs™, is also available. This information is important because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present. For more information, call the ATSDR Information Center at 1-800-232-4636.

### Overview

We define a public health statement and show how it can help you learn about trichloroethylene.

### Introduction

A public health statement summarizes information about a hazardous substance. The information is taken from a toxicological profile developed by the Agency for Toxic Substances and Disease Registry's (ATSDR's) Division of Toxicology and Human Health Sciences (DTHHS). A toxicological profile is a thorough review of a hazardous substance.

This toxicological profile examines trichloroethylene. This public health statement summarizes the DTHHS' findings on trichloroethylene, describes the effects of exposure to it, and describes what you can do to limit that exposure.

### Trichloroethylene at hazardous waste sites

The U.S. Environmental Protection Agency (U.S. EPA) identifies the most serious hazardous waste sites in the nation. U.S. EPA then includes these sites the National Priorities List (NPL) and targets it for federal clean-up activities. U.S. EPA has found trichloroethylene in at least 1,045 of the 1,699 current or former NPL sites.

The total number of NPL sites evaluated for trichloroethylene is not known. But the possibility remains that as more sites are evaluated, the number of sites at which trichloroethylene is found may increase. This information is important; these future sites may be sources of exposure, and exposure to trichloroethylene can be harmful.

DEPARTMENT OF HEALTH AND HUMAN SERVICES, Public Health Service  
Agency for Toxic Substances and Disease Registry

[www.atsdr.cdc.gov/](http://www.atsdr.cdc.gov/) Telephone: 1-800-232-4636 Fax: 770-488-4178 E-Mail: [cdcinfo@cdc.gov](mailto:cdcinfo@cdc.gov)

# Concerns in the regulated community - Transactional

- Owners/Sellers – Vapor intrusion now a concern where it wasn't before – even for impacted sites with prior closure approval.
- Buyers – Vapor intrusion risk is difficult to quantify and time-consuming to investigate.
- Lenders – Uncertainty regarding vapor intrusion risk and fluid regulatory environment complicates new loans; Loans approved before vapor intrusion trendy (or under old standards) now coming up for re-approval.



# Concerns in the regulated community

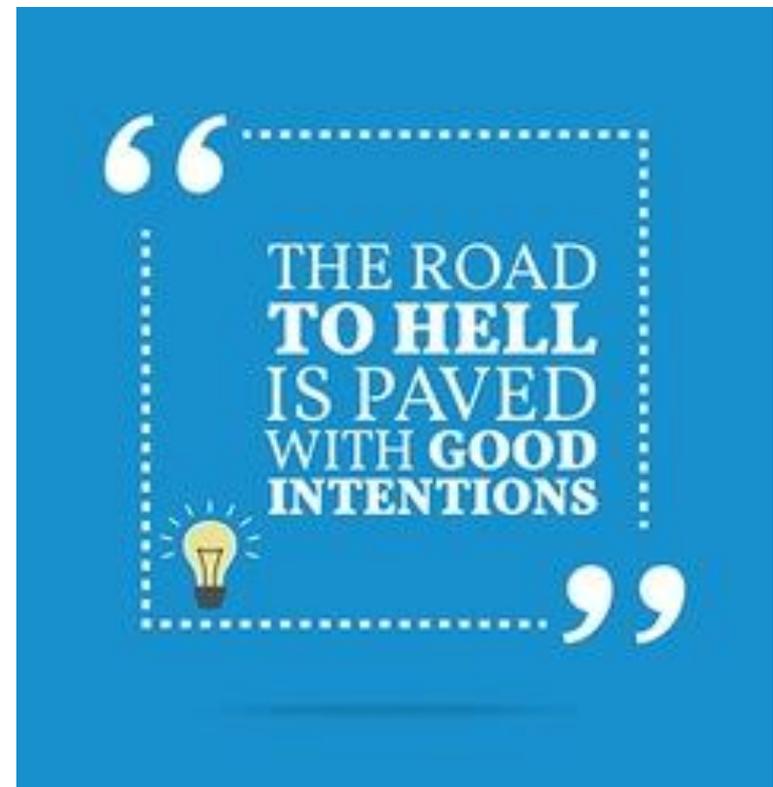
## - Technical

- VI impacts/risks difficult to identify and quantify.
- Sampling methods/theories changing and evolving.
- Time variations make it hard to get a “snapshot.” (daily, seasonal, weather)
- Closure status uncertain (federal, state levels).
- Inconsistency among states is making it tough to comply with and anticipate each state program; various stages of adopting new federal technical guidance (OSWER 2015).
- Toxicology in dispute – but typically becoming more concerning and safe exposure levels more stringent (particularly for TCE).



# How did we get here?

- Risk-based cleanup programs and standards encouraged the redevelopment and use of contaminated properties based on the anticipated future use.
- BUT - did not generally account for the vapor intrusion pathway.



# How did we get here?

- To help assess the subsurface vapor intrusion pathway, the Office of Solid Waste and Emergency Response (OSWER) released in November 2002 for comment EPA's Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils ("Draft VI Guidance").
  - 2015 OSWER Guidance

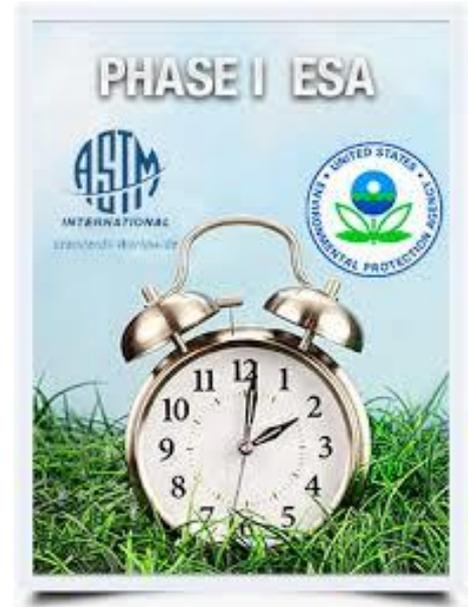
# How did we get here?

- While some states were considering VI issues before the 2002 USEPA Guidance, most waited until after it was released to begin addressing VI in their own state cleanup and/or enforcement programs.



# How did we get here?

- In 2008, ASTM released its vapor intrusion screening practice E2600-08, which was updated in 2010.
  - In Dec. 2012, US EPA releases OSWER Five-year Review Guidance on Assessing Protectiveness at (Superfund) Sites for Vapor Intrusion.”
  - Then, in 2013...
- ... **Vapor Intrusion goes “mainstream”**
- 2013 – ASTM updated **Phase I Practice E1527-13** – includes the vapor intrusion pathway for the first time.
  - By this time, many states also had VI regulations or guidance.



## Updated ASTM Standard – E1527-13: Vapor Intrusion Now an Included Pathway

- Consideration of the vapor intrusion pathway is now explicitly required (but use of ASTM E 2600 not mandated).
- Prior versions of E1527 noted “indoor air quality” as a non-scope consideration, which some interpreted as investigation of vapor intrusion.
- The (entirely) new definition of “migrate” refers to movement of hazardous substances or petroleum in any form including “vapor in the subsurface.” (sec. 3.2.56)

# Updated ASTM Standard – E1527-13: Vapor Intrusion Now an Included Pathway

## **ASTM 1527-13: NEW Section 3.2.56**

*migrate/migration*—for the purposes of this practice, “migrate” and “migration” refers to the movement of hazardous substances or petroleum products in any form, including, for example, solid and liquid at the surface or subsurface, and vapor in the subsurface. See Note 4.

NOTE 4—Vapor migration in the subsurface is described in Guide E2600; however, nothing in this practice should be construed to require application of the Guide E2600 standard to achieve compliance with all appropriate inquiries.

## Updated ASTM Standard – E1527-13: Vapor Intrusion Now an Included Pathway

- Thus – “All Appropriate Inquiry” is not achieved unless vapor intrusion risk is addressed in the Phase I.
- Industry anticipated this change for several years, and many consultants already were adding VI investigation to the Phase I scope anyway.
- **However, since E2600 is not required, inconsistency and uncertainty about how VI is addressed in Phase Is remains.**



## Updated ASTM Standard – E2600-15

### By the way...

- ASTM E2600, **Standard Guide for Vapor Encroachment Screening on Property Involved in Real Estate Transactions**, was just revised in 2015.
- Provides a process for conducting a Vapor Encroachment Screen (VES) to determine if a Vapor Encroachment Condition (VEC) **exists** or **does not exist**. VEC = ‘presence or likely presence of Chemical of Concern (COC) vapors in the vadose zone of the target property...’
- Previously, goal was to define a procedure for identifying whether a VEC “exists, likely exists, cannot be ruled out, or can be ruled out because a VEC does not or is not likely to exist.”
- Tier 1 VES screen can be conducted with a Phase I; if a VEC exists, the EP should determine if the VEC represents a REC.

# USEPA Region 9 Guidance

## December 3, 2013 – Letter and Memo

US EPA Region 9 responded to a request from the San Francisco Bay Regional Water Quality Control Board (Regional Water Board) in conducting vapor intrusion evaluations at the several Regional Water Board-lead NPL sites in the South San Francisco Bay Area (South Bay Sites) where TCE and PCE were contaminants of potential concern.

***Recommended “prompt response action levels” for TCE***



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
Region 9  
75 Hawthorne Street  
San Francisco, CA 94105

December 3, 2013

Stephen Hill, Chief  
Toxics Cleanup Division  
California Regional Water Quality Control Board – SF Bay Region  
1515 Clay Street #1400  
Oakland, CA 94612

**SUBJECT:** EPA Region 9 Guidelines and Supplemental Information Needed for Vapor Intrusion Evaluations at the South Bay National Priorities List (NPL) Sites

Dear Mr. Hill:

The United States Environmental Protection Agency (EPA) Region 9 appreciates the opportunity to work with the San Francisco Bay Regional Water Quality Control Board (Regional Water Board) in conducting vapor intrusion evaluations at the following Regional Water Board-lead National Priorities List (NPL) or Superfund sites in the South San Francisco Bay Area (South Bay Sites) where trichloroethene (TCE) or tetrachloroethene (PCE) are contaminants of potential concern:

- AMD 901/902/TRW Microwave/Phillips and Offsite Operable Unit Combined Sites in Sunnyvale
- AMD 915 DeGuigne Drive Site in Sunnyvale
- Monolithic Memories Site (also known as AMD 1165/1175 Arques Avenue Site) in Sunnyvale
- Fairchild Semiconductor Site in South San Jose
- Hewlett Packard 620-640 Page Mill Road Site in Palo Alto
- Intersil/Siemens Site in Cupertino and Sunnyvale
- National Semiconductor Site (also known as Texas Instruments Site) in Sunnyvale
- Synertek Building 1 Site in Santa Clara
- Teledyne/Spectra-Physics Sites in Mountain View

EPA recognizes and appreciates all of the vapor intrusion work activities conducted to date at these sites. Pursuant to recent discussions with EPA Region 9, the Regional Water Board, and the potentially responsible party (PRP) representatives on planned upcoming vapor intrusion work activities, EPA

## USEPA Region 9 Guidance

### Relies on US EPA 2011 Toxicological Review of Trichloroethylene in Support of the Integrated Risk Information System (IRIS)

- “Because this is a developmental effect, the critical period for exposure is considered to be within an approximate 3-week period in the first trimester of pregnancy during which the heart develops. Scientific information on the exact critical period of exposure for this health impact is not currently available; however, general risk assessment guidelines for developmental effects indicate that exposures over a period as limited as 24 hours may be of concern for some developmental toxicants.”
- “These guidelines identify women of reproductive age as the sensitive population of concern, rather than only pregnant women, because some women may not be aware of their pregnancy during the first trimester.”

# USEPA Region 9 Guidance

| <b>Interim TCE Indoor Air Short-Term Response Action Levels<br/>                     Residential and Commercial TCE Inhalation Exposure<br/>                     from Subsurface Vapor Intrusion<br/>                     South Bay NPL Sites</b> |  |
|---|--|
| <i>Exposure Scenario</i>  | <i>Prompt Response Action Level<br/>(HQ=1)<sup>2</sup></i> |
| Residential *   | 2 µg/m <sup>3</sup>  |
| Commercial/Industrial<br>8-hour workday   | 9 µg/m <sup>3</sup>  |

“In the event the indoor air TCE concentration related to subsurface vapor intrusion is detected above the prompt response action levels [2 µg/m<sup>3</sup> for Residential and 9 µg/m<sup>3</sup> for a Commercial/Industrial 8-hr workday], then interim mitigation measures should be evaluated and implemented quickly, and their effectiveness (defined as a reduction of the TCE indoor air concentration to below [the applicable action level]) confirmed promptly (**e.g., all actions completed and confirmed within a few weeks**).” (emphasis added)

# USEPA Region 9 Guidance

## **Implementation of Interim Measures to Mitigate TCE Short-term**

**Exposure:** The following interim response actions (mitigation measures) should be considered along with how quickly they can be implemented to reduce exposure to below the TCE short-term response action levels:

- Increasing building pressurization and/or ventilation mechanically with fans or the building ventilation system by increasing outdoor air intake
- Installing and operating engineered, sub-floor exposure controls (sub-slab and/or crawlspace depressurization; or in some cases a soil vapor extraction system)
- Eliminating exposure by temporary relocation, which may be indicated when immediate response actions are warranted.

The following interim measures may also be considered, but may have limited effectiveness and require additional monitoring to verify their effectiveness:

- Sealing and/or ventilating potential conduits where vapors may be entering building
- Treating indoor air (carbon filtration, air purifiers).

# OSWER VI Technical Guidance

- 2015 - U.S. EPA publishes new technical guidance for performing vapor intrusion assessments (updating the draft 2002 guidance):
  - “Technical Guide for Addressing Petroleum Vapor Intrusion at Leaking Underground Storage Tank Sites,” EPA 510-R-15-001, June 2015
  - “OSWER Technical Guidance for Assessing and Mitigating the Vapor Intrusion Pathway from Subsurface Vapor Sources to Indoor Air,” OSWER Publication 9200.2-154, June 2015

*“Since the [2002] Draft VI Guidance was released, EPA’s knowledge of and experience with assessment and mitigation of the vapor intrusion pathway has increased considerably, leading to an improved understanding of and enhanced approaches to evaluating and managing vapor intrusion.”*

# OSWER VI Technical Guidance

## OSWER 2015 Technical Guide

- Two Step Process:
  - A **Preliminary Analysis** to develop an initial understanding of the potential for human health risks from VI.
  - A **Detailed Investigation**, which is generally recommended if the Preliminary Analysis indicates the presence of subsurface contamination with vapor-forming chemicals underlying or near buildings.

# OSWER VI Technical Guidance

## OSWER 2015 Technical Guide

- Develop a Conceptual Site Model (CSM)
- “Worst first” approach
- Recommends collecting indoor air samples early in an investigation; pair sub-slab and ambient sample locations.
- Recommends sampling in various media/ locations (ground water, deep (near-source) soil gas, sub-slab soil gas, indoor air, etc.) to enhance a "multiple lines of evidence" approach instead of just soil gas data from outside a building.
  - *“Exterior soil gas samples cannot be generally expected to accurately estimate sub-slab or indoor air concentrations.”*
- More specific conditions for preemptive or early actions, including relocation of individuals.
- New attenuation factors.

# OSWER VI Technical Guidance

- Consider collecting multiple rounds of indoor air samples,<sup>9</sup> using time-integrated measurements (Section 6.4.1) to estimate exposure concentrations appropriate for the exposure (occupancy) scenario being evaluated (e.g., residential versus commercial), when the risk assessment for an existing building would support a conclusion that the human health risks are acceptable (Section 7.4).
  - Note 9: Because weather conditions and building operations can lead to time-variable contributions from vapor intrusion and ambient air infiltration, indoor air concentrations of vapor-forming chemicals can be expected to vary over time (see, for example, Section 2.6). An individual sample (or single round of sampling) would be insufficient to characterize seasonal variability, or variability at any other time scale.
- Survey the building to identify potential sources not related to actual vapor intrusion.



# OSWER VI Technical Guidance

- The OSWER Technical Guidance recommends that a Human Health Risk Assessment be conducted when the vapor intrusion exposure pathway is present. Section 7.4
- BUT, the guidance recommends against using OSHA Permissible Exposure Limits (PELs) – as they are “not intended to protect sensitive workers, may not incorporate the most recent toxicological data, and may differ from EPA derivations of toxicity values with respect to weight-of-evidence considerations and use of uncertainty factors.” Section 7.4.3.


$$\text{RISK} = \text{EXPOSURE} \times \text{TOXICITY}$$

# OSWER VI Technical Guidance

- The OSWER Technical Guidance seems to disfavor the use of building control technology to address vapor intrusion issues: “[E]ngineered exposure controls are considered ‘interim’ remedies...because their implementation does not substitute for remediation of the subsurface sources(s) of vapor-forming chemicals.” (Section 3.3, note 81)



# OSWER VI Technical Guidance

## Introduces the **Vapor Intrusion Screening Level (VISL) Calculator**

- Downloadable Excel Spreadsheet
- Provides a list of volatile and toxic chemicals
- Medium-specific, risk-based target concentrations for groundwater, soil-gas and indoor air
- Industrial/commercial and residential categories
- Intended to be updated frequently with new toxicity data.
- Can be used to avoid the Detailed Investigation Stage to demonstrate that indoor air concentrations are too low to represent a health risk.



# Massachusetts

## April 2016 Press Release:

The Massachusetts Department of Environmental Protection (MassDEP) Bureau of Waste Site Cleanup (BWSC) is screening nearly 1,000 **closed sites** with known trichloroethylene contamination to determine at which sites TCE has the potential to pose an Imminent Hazard based on the current understanding of health risks, even if a site was previously closed properly under earlier standards. Based on initial screening, MassDEP estimates that further follow-up may be indicated for approximately 200 sites and that this work will continue through 2016.



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Executive Office of Energy & Environmental Affairs

Department of Environmental Protection  
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Charles D. Baker  
Governor  
Karyn E. Polito  
Lieutenant Governor

Matthew A. Beaton  
Secretary  
Martin Suuberg  
Commissioner

### MassDEP Bureau of Waste Site Cleanup's Plan for Evaluating Potential Imminent Hazards from Trichloroethylene (TCE) Vapor Intrusion at Closed Sites April, 2016

The Massachusetts Department of Environmental Protection (MassDEP) Bureau of Waste Site Cleanup (BWSC) is screening nearly 1,000 closed sites with known trichloroethylene contamination to determine at which sites TCE has the potential to pose an Imminent Hazard based on the current understanding of health risks, even if a site was previously closed properly under earlier standards<sup>1</sup>. Based on initial screening, MassDEP estimates that further follow-up may be indicated for approximately 200 sites and that this work will continue through 2016.

#### Changes in TCE Risk-Based Levels Prompting Closed Site Review

*New information about the potential toxicity of TCE has resulted in MassDEP developing more stringent screening levels for TCE in indoor air and groundwater.*

|                              | Levels of Concern<br>Prior to 2011 Revision | Current<br>Levels of Concern    |
|------------------------------|---|---------------------------------|
| Indoor Air (residential)     | 85 µg/m <sup>3</sup>                        | 6 µg/m <sup>3</sup>             |
| Groundwater (near residence) | 300 µg/L pre-2006<br>50 µg/L post-2006      | 5 µg/L                          |
| Health Effect of Concern     | Longer-term cancer risk                     | Short-term developmental effect |

<sup>1</sup> A 2011 revision to the US EPA toxicity information for trichloroethylene (TCE) was based, in part, on potential fetal developmental effects following even a short-term exposure. The evaluation of exposures and effects of this nature for TCE had not previously been part of the standard assessment of 21E disposal sites. This new information has sparked a nation-wide discussion of whether the cleanups of previously closed sites with TCE are sufficiently protective. In Massachusetts, the Department of Environmental Protection is implementing a strategy, developed with the support of the Waste Site Cleanup Advisory Committee, to systematically review past closures and, where necessary, work with site stakeholders to identify and eliminate any ongoing Imminent Hazards. M.G.L. Chapter 21E requires MassDEP, when "significant evidence exists at any time of an imminent hazard," to "immediately ensure" that "action is taken to control the potential for health damage, human exposure, safety hazards and environmental harm." G.L. c. 21E, § 3A(e).

# Massachusetts

Once MassDEP completes a more detailed review of site information in the files, MassDEP will:

1. Prioritize the sites and initiate follow-up work at a pace that will allow for sufficient case-specific technical assistance while addressing the site posing the greatest potential risk first.
2. Contact the owner of each site identified for follow-up to explain that there is a possibility of an Imminent Hazard due to levels of TCE in the environment, and encourage evaluation of the vapor intrusion pathway to determine if an Imminent Hazard exist or not. Regional staff will provide background information on TCE and the vapor intrusion pathway, as well as contacts and phone numbers for the owner to call for further assistance.
3. Conduct necessary evaluations if an owner cannot or will not perform the evaluation.

# Massachusetts

***Property owners and/or Potentially Responsible Parties of previously closed TCE sites need not and should not wait for MassDEP to make the initial contact.*** The Department encourages parties to review existing information about a site and begin to evaluate current conditions to determine if there is a potential for ongoing exposure to TCE.



# Ohio

## May 24, 2016 Memo

- The Division of Environmental Response and Revitalization (DERR) is rescinding aspects of its guidance document titled, “Sample Collection and Evaluation of Vapor Intrusion to Indoor Air for Remedial Response and Voluntary Action Programs (May 2010).” DERR considers Chapter 10 (Data Evaluation) and Chapter 11 (Modeling the Vapor Intrusion Pathway) to be out of date and are no longer considered appropriate guidance for projects seeking cleanup under any of DERR’s programs.
- Until DERR has the opportunity to revise these chapters or issue new guidance, it is appropriate to rely on U.S. EPA’s guidance document titled, “Technical Guide for Assessing and Mitigating the Vapor Intrusion Pathway from Subsurface Vapor Sources to Indoor Air (June 2015)” and U.S. EPA’s Vapor Intrusion Screening Level (VISL) calculator.
- Even before this, Ohio EPA has heavily scrutinized TCE Sites; consultants under pressure to disclose data when health issue could exist.



John R. Kasich, Governor  
Mary Taylor, Lt. Governor  
Craig W. Butler, Director

### Memorandum

**To:** Environmental Consultants, VAP Certified Professionals, Attorneys, and Other Interested Parties  
**From:** Mike Proffitt, Chief, Division of Environmental Response and Revitalization  
**Date:** May 24, 2016  
**Re:** Ohio EPA’s 2010 Vapor Intrusion Guidance

The Division of Environmental Response and Revitalization (DERR) is rescinding aspects of its guidance document titled, “Sample Collection and Evaluation of Vapor Intrusion to Indoor Air for Remedial Response and Voluntary Action Programs (May 2010).” DERR considers Chapter 10 (Data Evaluation) and Chapter 11 (Modeling the Vapor Intrusion Pathway) to be out of date and are no longer considered appropriate guidance for projects seeking cleanup under any of DERR’s programs.

Until DERR has the opportunity to revise these chapters or issue new guidance, it is appropriate to rely on U.S. EPA’s guidance document titled, “Technical Guide for Assessing and Mitigating the Vapor Intrusion Pathway from Subsurface Vapor Sources to Indoor Air (June 2015)” and U.S. EPA’s Vapor Intrusion Screening Level (VISL) calculator.

In light of this memorandum, projects should re-evaluate the vapor intrusion pathway to ensure on and off-property receptors are not at risk from the vapor intrusion pathway. Projects currently under review will be re-evaluated against this change in guidance. Please contact the DERR Site Coordinator leading the review of your project for further questions.

# Ohio

## August 2016 Guidance

- Ohio EPA issues guidance that demands immediate action when contaminant levels exceed certain established “trigger” levels.
- U.S. EPA Vapor Intrusion Guidance discusses prompt actions to be taken when measured indoor air concentrations pose an unacceptable human health risk for an acute or short-term exposure scenario (See Sections 7.5 and 8.2.1 of OSWER Technical Guide); and U.S. EPA Region 9 and other states (e.g., MA, CT, NJ, NH) have developed accelerated response action levels for measured indoor air TCE concentrations in structures occupied by women of childbearing age.



**GUIDANCE DOCUMENT**  
**RECOMMENDATIONS REGARDING RESPONSE ACTION LEVELS AND TIMEFRAMES FOR**  
**COMMON CONTAMINANTS OF CONCERN AT VAPOR INTRUSION SITES IN OHIO**

August 2016

**Disclaimer**

This guidance has been shown to the Agency for Toxic Substances and Disease Registry (ATSDR) and the U.S. Environmental Protection Agency (USEPA). USEPA provided a letter indicating concurrence with these response levels and timeframes for response. As such, this guidance represents the Division of Environmental Response and Revitalizations approach to sites that have subsurface vapor intrusion into homes and businesses. The Ohio EPA recommends these action levels and timeframes, but recognizes other governmental agencies may use a different approach. As such this guidance does not have the force of law.

**Purpose**

This memorandum establishes response actions and timeframes for concentrations of common chemicals encountered during vapor intrusion (VI) investigations when receptors are present. Response actions may include sampling, mitigation, and/or activities to reduce exposure to elevated concentrations of chemicals due to vapor intrusion.

**Vapor Intrusion Overview**

Ohio EPA and U.S. EPA use a multiple lines of evidence approach to investigate potential VI risk to receptors. This step-wise approach typically evaluates whether a complete exposure pathway exists by sampling soil, ground water, soil gas, sub-slab gas or indoor air as appropriate. Concentrations of chemicals are evaluated using defined risk assessment procedures or screening values. Following this risk evaluation and discussions between appropriate parties, decisions may include:

- no further action
- source removal
- monitoring
- passive or active engineering controls

**Conceptual Site Model**

Ohio EPA's Vapor Intrusion Guidance<sup>1</sup> and U.S. EPA Vapor Intrusion Guidance<sup>2</sup> emphasize a multiple lines of evidence approach to evaluate whether the potential for VI exists from releases at CERCLA, RCRA, or

# Other states

## MICHIGAN:

- New Cleanup Criteria and Screening Levels – Draft June 2016
- New proposed Part 201 Cleanup Criteria Rules – October Public Hearings

**NEW JERSEY:** August 2016 Released Version 4.0 of its VI guidance

**KANSAS:** New VI Guidance August 2016

**WISCONSIN:** RR-800 VI guidance modified in 2015; case closure requires VI pathway assessment



### **CLEANUP CRITERIA AND SCREENING LEVELS DEVELOPMENT AND APPLICATION**

REMEDIATION AND REDEVELOPMENT DIVISION  
RESOURCE MATERIALS



**Prepared by:**  
Michigan Department of Environmental Quality  
Remediation and Redevelopment Division  
525 West Allegan Street  
Lansing, Michigan 48933

**DRAFT** June 2016

# Illinois

- New vapor intrusion regulations effective on July 15, 2013. Added the indoor inhalation pathway to the Tiered Approach to Corrective Action Objectives (TACO)(Part 742 of Title 35 of the Illinois Administrative Code)
- No intent by IEPA to re-open closed sites, BUT pre-2013 No Further Remediation (NFR) Letters have less practical impact because the VI pathway was most likely not considered.
- IEPA favors use of Building Control Technology (BCT) to address indoor inhalation pathway.
- IEPA has no current plans to amend TACO to conform to 2015 OSWER Guidance.



# Addition of Subsurface Component to the Hazard Ranking System (HRS)

- The Hazard Ranking System (HRS), required by the Superfund statute, is the primary mechanism used by the EPA to assess the relative threat associated with actual or potential releases of hazardous substances. As a matter of agency policy, those sites that score 28.5 or greater under the HRS are eligible for inclusion on the National Priorities List (NPL).
- In a May 2010 report, the Government Accountability Office (GAO) concluded that if vapor intrusion sites are not assessed and, if needed, listed on the NPL, some seriously contaminated hazardous waste sites with unacceptable human exposure may not otherwise be cleaned up.
- “EPA evaluated the need for this proposed addition to the current HRS by identifying the scope of the subsurface intrusion contamination problem. These efforts to identify and classify sites that may pose a subsurface intrusion threat have resulted in the identification of 1,073 sites that may or may not qualify for the NPL but are suspected of having vapor intrusion issues.” 81 Fed. Reg. 10372 at 10374 (Feb. 29, 2016).

## Addition of Subsurface Component to the Hazard Ranking System (HRS)

- US EPA stated that it must amend the current HRS because it “does not consider the threat posed by subsurface intrusion in its evaluation of relative risk posed by a site; therefore it does not provide a complete assessment of the relative risk that a site may pose to the public.” 81 Fed. Reg. 10372 at 10373 (Feb. 29, 2016)
- Thus, the EPA is working toward a proposed rulemaking to add a new screening component to the HRS that would allow sites with vapor intrusion contamination to be evaluated for placement on the NPL. This addition would enable the HRS to directly consider the human exposure to contaminants that enter building structures through the subsurface environment.
- Numerous Public Comments Submitted – comment period closed April 29, 2016
- August 2016 - U.S. EPA submits draft rule to the White House OMB.

# Addition of Subsurface Component to the Hazard Ranking System (HRS)

| <b>Milestone</b>                              | <b>Date</b>         |
|---|---------------------|
| Initiated                                     | 01/06/2011          |
| NPRM: Sent to OMB for Regulatory Review       | 02/03/2012          |
| NPRM: EPA Withdrew Rule from Review           | 02/27/2014          |
| NPRM: Sent to OMB for Regulatory Review       | 06/08/2015          |
| NPRM: Received by OMB                         | 06/10/2015          |
| NPRM: Regulatory Review Concluded             | 12/21/2015          |
| <a href="#">NPRM: Published in FR</a>         | 02/29/2016          |
| NPRM: Comment Period Open                     | 02/29/2016          |
| NPRM: Comment Period Closed                   | 04/29/2016          |
| Final Rule: Sent to OMB for Regulatory Review | 08/31/2016          |
| Final Rule: Received by OMB                   | 09/02/2016          |
| Final Rule: Published in FR                   | 12/2016 (projected) |

\*NPRM= Notice of Proposed Rulemaking

# QUESTIONS?



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