

Vapor Intrusion Challenges - What Types of Samples to Collect, Is Preemptive Mitigation Always a Solution and What is the Most Commonly Missed Source?

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Challenge #1 - What type of samples are appropriate to collect?

1. Deep Soil Gas
2. Shallow Soil Gas
3. Sub-Slab Samples
4. Indoor Air Samples
5. Ambient Air Samples

*For the purpose of this discussion, we will assume that chlorinated solvents are the COC's of concern. A different approach is needed if petroleum hydrocarbons are the COC's.

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Challenge #1 - What type of samples are appropriate to collect?

The type of sample collected depends on the purpose of the sample being collected. The following questions must be answered to determine the appropriate samples to collect:

1. Is the purpose of the samples to determine if the property has been impacted?
2. Are we most concerned with human health and safety?
3. If we are dealing with a building, is it occupied, do they still use the COC's?
4. Is it a combinations of the answers above?

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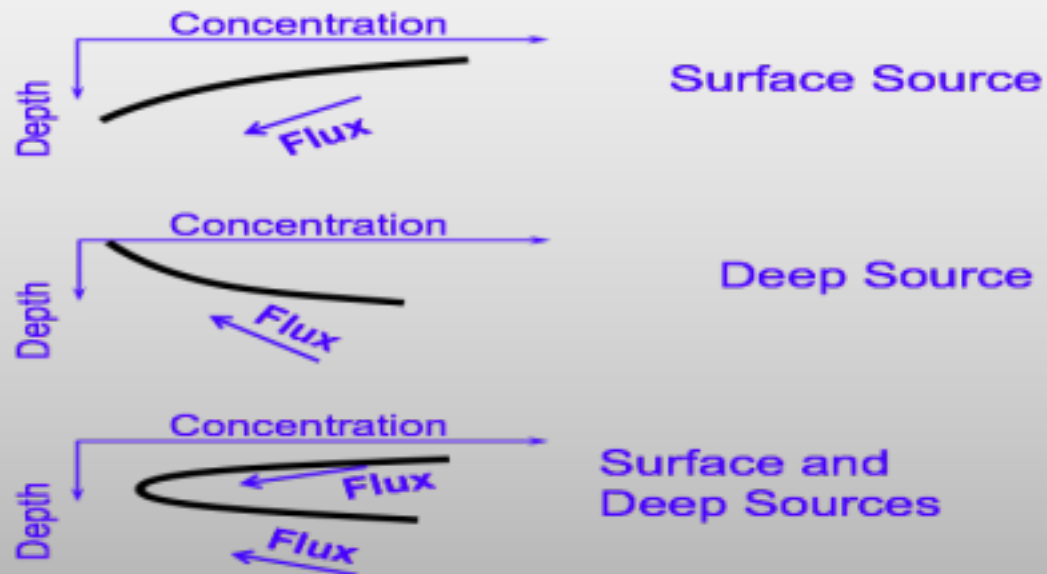
Assumption for scenario #1 - The purpose of the sample is to determine if the property has been adversely impacted by off site sources?

Paired (deep and shallow) soil gas samples are typically recommended.

1. Deep soil gas samples collected within 5' of the groundwater table are appropriate to determine if groundwater is a potential source for VI concerns.
2. Shallow soil gas samples help determine if preferential pathways exist that allow vapors to migrate onto the property

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Assumption for scenario #1 - The purpose of the sample is to determine if the property has been adversely impacted by off site sources?



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Assumption for scenario #2 - The purpose of the sample is to determine if the property has been adversely impacted by the current or former on site operations.

Paired (deep and shallow) soil gas samples are typically recommended but a greater sample density is **typically required depending on site conditions**.

1. Deep soil gas samples collected within 5' of the groundwater table are appropriate to determine if contaminated groundwater is a potential source for VI concerns.
 2. Shallow soil gas samples help determine if former of existing operations may be a VI concern (tanks, septic field, vats, plating pits, etc.)
- We will discuss the “missing source” for many vapor issues in a few slides

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Assumption for scenario #3 - The purpose of the sample is to determine if there is a risk of exposure of to residents or employees.

Sub-slab samples are typically recommended to determine if there is a modeled risk to residents or employees. The number of samples needed to accurately determine the potential risk should be based on the following factors:

1. Residential or non residential use (formerly known as commercial use)?
2. Are sub-sensitive (children, seniors, people with existing illness) people present?
3. If non residential use, where in the structure are there exposure risks?

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Assumption for scenario #4 - Sub-slab samples results indicate that there is a potential risk to residents or employees and the COC's are currently being used onsite.

Here are a few (many others exist) of the additional steps that can be taken to further define/determine if the is actually a risk to human health.

1. Collect data to calculate a slab specific attenuation factor instead of accepting the default EPA value (.03) that is very conservative.
2. Look at building air exchange rates and see if simple HVAC modifications can solve the problem.
3. Consider rearranging the layout of the building (if non residential) to minimise the potential exposure.

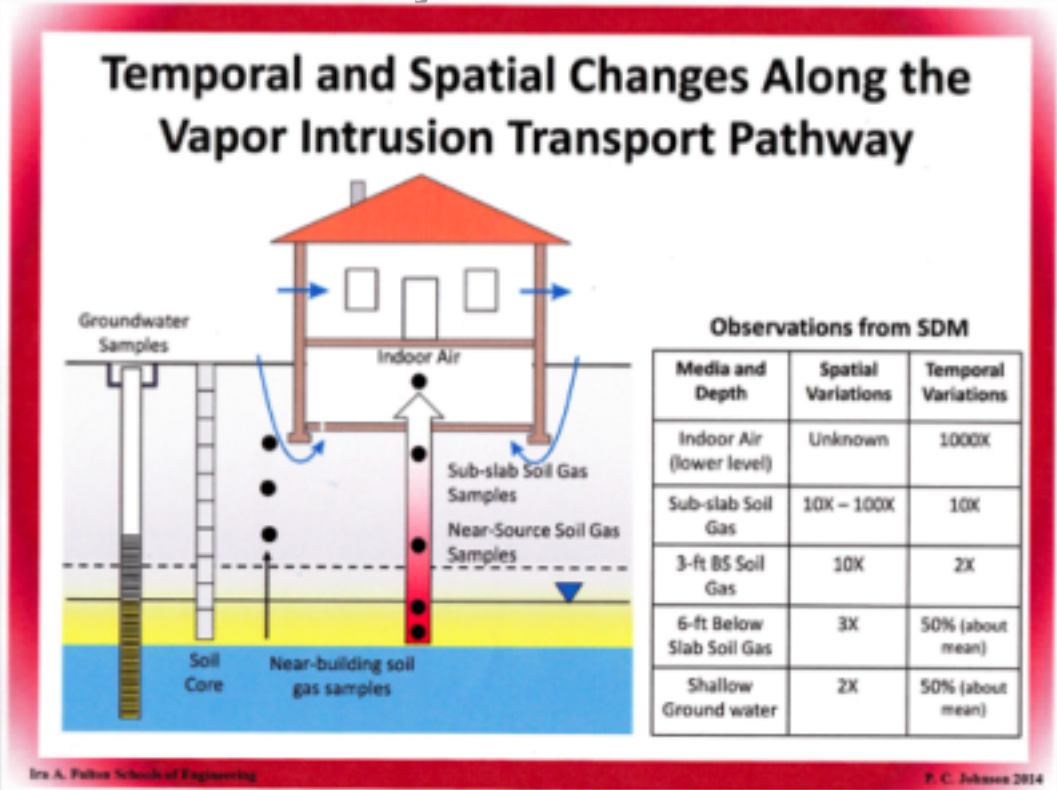
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Assumption for scenario #5 - Sub-slab samples results indicate that there is a potential risk to residents or employees and the COC's are not currently being used onsite and have not been used onsite for a long period of time.

Collection of indoor air samples can ultimately answer the question of exposure risk (be prepared if the answer to the questions is not what you expect). Below are a few of the best practices used if collecting indoor air samples:

1. Always collect ambient air samples in conjunction with indoor air samples.
2. Remove all possible sources of chemicals from within a house if the you are sampling at a residence.
3. Note any and all products that are not removed from a structure (residential or not).

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Preemptive Mitigation - Is it the solution so you don't have to worry about all the sample types previously discussed?

1. Mitigation only addresses the question of exposure to occupants of a residential or nonresidential structure and does not address the question of if the property has been adversely impacted.
2. Active mitigation systems should only be allowed after a determination of risk has been made. If there was 10,000,000 ug/m³ in the sub-slab and the active mitigation system goes offline, is there a risk of exposure? How about 1,000,000 ug/m³? How about 100,000? Knowing the potential risk is key in determining if an active mitigations system alone is sufficient. Multiple types of mitigation systems may be necessary.

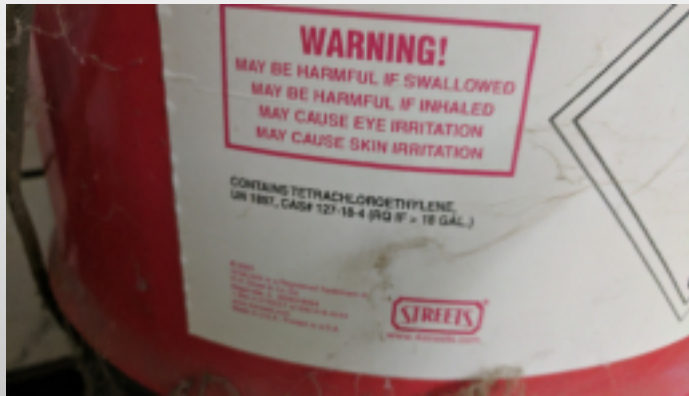
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Preemptive Mitigation:

1. Active mitigation is a very effective form of mitigation if properly conducted. In situations where high levels of contamination exist (only known after sampling) ,a telemetry based system should be employed. We use telemetry for soil and groundwater remediation systems, why not with the most critical pathway - vapor intrusion.
2. Passive mitigation systems such as Geo-Seal, Cupolex and Retro-Coat require care and maintenance but are not subject to power outages or tenants that do not want to follow the direction of landowners or landlords.

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What is the most commonly missed major source of VI concerns for sites where chlorinated solvents have been used in the recent past or are still being used?



Vapor Clouds

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Vapor clouds are a major source of contamination even if soil and groundwater samples have little or no contamination. This potential source of vapor intrusion is often missed if no sub-slab vapor samples are collected.

1. Vapor clouds refer to situations where there is subsurface contamination of the soil vapor with little or no coincident soil or groundwater contamination, hence the term "cloud." They arise from leaking vapors, not from contaminated soil or groundwater.
1. Once in the subsurface, the vapors often travel thru the engineered fill (gravel or other fill material) under concrete slabs to other parts of the structure or into other structures that share a common slab.

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Demonstration Time

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Questions?



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