Vapor Intrusion Questions and Answers
May-June-July-August

Land Recycling - Questions and Answers
June 2004

Question:
I noticed that on Table 8 of the vapor intrusion guidance, the exposure frequency (days/yr) for both soil and groundwater is listed as 350, 250 (for residential, nonresidential).
I also noticed that the exposure assumptions used to calculate the inhalation numeric values for groundwater (25 PA Code § 250.307(h)) also lists the exposure frequency as 350 days & 250 days (for residential & nonresidential). But the exposure assumptions used to calculate the inhalation numeric values for soil (25 PA Code § 250.307(d)) lists the exposure frequency as 250 days & 180 days (for residential & nonresidential).
Since soil and groundwater have different exposure frequency assumptions in 25 PA Code §250.307, I am wondering why the soil and groundwater exposure frequencies listed in Table 8 of the Vapor Intrusion Guidance are the same? Would it be wrong to use an exposure frequency of 180 days for vapor intrusion from soil at a non-residential site?
Answer:
The exposure frequency as 350 days & 250 days (for residential & nonresidential) in the vapor guidance is for indoor air exposures, while the exposure frequency as 250 days & 180 days (for residential & nonresidential) to calculate the inhalation numeric values for soil (25 PA Code § 250.307(d)) is for outdoor exposures. It is not appropriate to apply the outdoor exposure frequency to the vapor intrusion scenarios.

Question:
For ethylbenzene, the toxicity values listed in Table 9 of the vapor guidance may not be consistent with the toxicity values listed in 25 Pa. Code, Chapter 250, Appendix A, Table 5 (relating to Physical and Toxicological Properties of substances) and the updated toxicity values. Can I conduct site-specific J&E modeling under the Statewide Health standard using the toxicity values specified in Chapter 250, Appendix A, Table 5?
Answer:
Yes, as long as the risk range is 1.0E-05 and HQ <1.0, (on a substance by substance basis), and using the same toxicological factors as specified in Chapter 250, Appendix A, Table 5 (relating to Physical and Toxicological Properties of substances).

Question:
What type of matrix do you use if your water table is different levels onsite and offsite. 2-3 ft below grade (onsite), 9-10 ft (offsite)
Answer:
It would be the measured water table under the receptor either on-site or off-site.

Question :
Can soil gas be collected as composite 8 or 24 hr?
Answer:
We recommend that indoor air be sampled as 8-24 hours. Soil gas is collected as a grab sample.

Question:
How did USEPA come up with 100 foot radius for evaluation of potential impacts to a building?
Answer:
The distance at which concentrations are negligible is a function of the mobility, toxicity, and persistence of the chemical, as well as the geometry of the source, subsurface materials, and characteristics of the building of concern. The horizontal distance of 100 feet from the source to receptor (inhabited building) was chosen as the criterion to define when sites were close enough and so needed to be addressed for vapor intrusion.

Question:
Can you recommend guidance for remedial approach to existing buildings with indoor air problems?
Answer:
Currently, we recommend a mitigation system that would be effective in meeting the indoor air criteria. These systems include, but not limited to, active soil vapor extraction or a system that is similar to the radon venting systems.

Question:
I have a question concerning certain SVOCS and the application of the vapor intrusion guidance.
The Introduction to the guidance states that it is for use in, "...assessing potential subsurface vapor intrusion of volatile organic and semivolatile contaminants...."
The first bullet of the Process for Soil section states that "If the volatile organic constituent is not l listed in the tables and is found to be of concern at a particular site, then a site-specific analysis should be used."
Do these two statements (above) imply that semivolatile contaminants that are not listed in the tables are not of concern for vapor intrusion (assuming statewide health standard)?
Answer:
The list of chemicals in the guidance was based on the definition of "volatile compound" in 25 Pa. Code 250.1: "a chemical compound with a boiling point less than 200o centigrade at 1 atmosphere" and the criteria specified in EPA' Risk Assessment Guidance for Superfund (RAGS), Volume I, Part B: "Chemicals with a Henry's Law constant of 1 x 10-5 atm-m3/mole or greater and with a molecular weight of less than 200 g/mole". Semivolatiles that do not meet these criteria or definition should not need site-specific analysis.

Question:
I am a bit confused regarding the sample analysis methods employed for the Indoor Air Quality guidance. Section §250.10(f) states, "For air, samples and analyses shall be performed in accordance with Chapters 131 and 139 (relating to ambient air quality standards, and sampling and testing)." As near as I can tell, I believe that this means using a GC/MS method. However, the Act 2 Indoor Air Guidance document does state that you can measure the indoor air samples by "…direct measurement using a FID or PID, adsorption onto activated charcoal…". At one of my sites, the consultant collected two air samples in charcoal tubes at each sample location. They analyzed one of these samples using NIOSH method 1500 or 1501 (GC/FID), and the other sample they analyzed using EPA method 624/8240/8260 (GC/MS). The NIOSH method provided much higher results. For example, sample SV-1-1 resulted in only 2 mg/m3 of Benzene using the EPA method, but sample SV-1-2 (same location) resulted in 45 ppm of Benzene using the NIOSH method. (Since Table 3 of the Act 2 Indoor Air Guidance is in units of mg/m3, the SV-1-2 would represent 143 mg/m3 of Benzene) My question is simply: Does Section 250.10(f) allow them to use the NIOSH method or not?
Answer:
Yes, the NIOSH methods are acceptable as long as the detection limits are low enough to do the comparison on Table 3.

Question:
Which column in Table 3 of the IAQ guidance is appropriate to use? The lowest level or the highest level? And wouldn't the OSHA PEL be applicable to all industrial sites?
Answer:
Table 3 - You will have to determine if it is Residential or Non-residential and pick the appropriate MSC. Most industrial facilities are under OSHA jurisdiction and if that is determined, you can go with the OSHA PEL.

Question:
Is the vapor intrusion guidance used for attainment samples or characterization samples, or both? The basis for my questions is a site where characterization sampling indicated concentrations of a COPIAC in soil that meet the statewide health standard for a used aquifer, but exceed the default screening value. However, systematic random attainment sampling indicated all compounds of concern, including COPIACS meet SHS and default screening values. Which set of data should I be evaluating?
Answer:
In some cases both sets of data need to be considered. Samples taken during the characterization of a site should be used to evaluate the potential for vapor intrusion into buildings. It is most appropriate to apply the screening process for vapor intrusion to the site characterization data in order to determine if intrusion pathways present a significant risk to indoor air. If subsequent remediation activities result in the removal or treatment of those area identified at potentially impacting indoor air, then attainment sample data may be used to demonstrate that vapor intrusion pathways present negligible risk to indoor air. However, for regulated substances identified as COPIACs, either in soil or groundwater, remediation may not address all locations that could present risk of exposure through vapor intrusion. This would apply to areas characterized as not exceeding the selected standard but which do exceed the screening levels in the guidance. For these areas the characterization sampling data are still appropriate for considering the risk posed by the vapor intrusion pathway.

Question:
A heating oil overspill (at vent pipe) outside the property. Excavation is only 3 X 8 ft and 2 feet deep and adjacent to the home.
I am having difficulty in determining whether there is a potential source and if the matrix is applicable. Based on the definition of vapor source---most of the soil sample results are below detection limits, however these values are above the PQLs. The site is adjacent to the building, however not below the receptor. (the highest reported concentration in 5 attainment samples is 0.107 mg/kg phenanthrene MSC = 10,000 mg/kg PQL = 0.66 mg/kg. In this case, phenanthrene would not be considered a vapor source, however benzene is reported at < 0.1 mg/kg (COPIAC for res. soils) and has a PQL of 0.005 mg/kg.) Is this a potential source?
Do I then go to potential pathways? Would the vent pipe, is described as "located along the front of the structure" which I assume is above grade--would not be considered a pathway and then move you to the middle column of the matrix? This scenario does not easily screen out because samples were only taken at 2 feet below grade...
Answer:
Since benzene is reported at < 0.1 mg/kg (COPIAC for res. soils) and has a PQL of 0.005 mg/kg, benzene may or may not be a potential source. For example, if the actual benzene concentration was 0.09 mg/kg (nevertheless reported as < 0.1 mg/kg,), this benzene could be a potential source. If the actual benzene concentration was <0.005 mg/kg (nevertheless reported as < 0.1 mg/kg), then this benzene would not be a potential source.
Please note that CSSAB Vapor Intrusion Subcommittee is currently working on the de minimus level issue for vapor sources < 5' below the receptor. Once developed, de minimum levels could alleviate situations like this.
In the mean time, the case could be resolved by conducting site-specific analysis using J-E model under the Statewide Health standard using vapor source concentrations of < 0.1 mg/kg at a depth of 2' below grade. Any visual staining or odor on the foundation walls would warrant further analysis.

Question:
I have a question regarding p-chloroaniline and vapor intrusion. I am currently conducting a vapor intrusion assessment where p-chloroaniline (CAS no. 106-47-8) is a major dissolved constituent in groundwater. Looking in Table 1 of the vapor intrusion guidance, there are no criteria for p-chloroaniline; however, there are p-chloroaniline groundwater criteria in the Statewide Health Standards Act 2 tables (Appendix A Table 1).
Is p-chloroaniline an organic compound that is exempt from vapor intrusion screening? Is this constituent a COPIAC? Is it a non-COPIAC? If it does have vapor intrusion criteria, please let me know what they are. If it does not, please provide guidance for completing a vapor intrusion assessment for this constituent.
Answer:
The list of chemicals in the guidance was based on the definition of "volatile compound" in 25 Pa. Code 250.1: "a chemical compound with a boiling point less than 200o centigrade at 1 atmosphere" and the criteria specified in EPA' Risk Assessment Guidance for Superfund (RAGS), Volume I, Part B: "Chemicals with a Henry's Law constant of 1 x 10-5 atm-m3/mole or greater and with a molecular weight of less than 200 g/mole". Semivolatiles that do not meet these criteria or definition should not need site-specific analysis.
The estimated Henry's Law constant for 4-chloroaniline based on the aqueous solubility of 3.9g/L at 25oC and vapor pressure of 0.027 mmHg at 26oC is about 1.16 X 10-6 atm-m3/mole. The boiling point is about 232oC at 760 mmHg. Since 4-chloroaniline does not meet the definition or criteria specified above, it is not listed in the guidance and would not need site-specific analysis.
Please note that the reported Henry's Law constant value for 4-chloroaniline in Howard's "Handbook of Environmental Fate and Exposure Data for Organic Chemicals" was erroneous. The estimated value should be 1.07 X 10-6 atm-m3/mole instead of 1.07 X 10-5 atm-m3/mole.

Question:
An underground tank was removed and filled with clean backfill (or gravel). There are still soils at the soil/bedrock interface 20'-30' below the ground surface that have SWH exceedences. The plan is to go SSS, using pathway elimination and deed restrictions. If any buildings ARE ever put over top of this former tank pit, then their deed notice says that a sub-slab ventilation system would be required to be incorporated into the construction. Is that sufficient?
Answer:
From the experience of radon mitigation, sub-slab ventilation system could reduce the exposures, but could not eliminate the exposure pathway for vapor. Under the Statewide Health standard, they could still use the screening values in the guidance or conduct site-specific analysis. Under the Site-Specific standard, they still need to establish a site-specific numeric standard in soil, indoor air, and/or groundwater (if necessary) using site-specific risk assessment. Once the sub-slab ventilation system is in place, they will need to document that the system is effective to reduce the vapor exposure for the vapor intrusion pathway to an acceptable level.

Question:
Can field screening results (PID results) be used to assess the vapor screen for an UST removal?
Answer:
According to the DEP's Closure Requirements for Underground Storage Tank Systems, We can accept PID as a field screening tool during tank excavation to determine if there is obvious contamination. In addition, confirmatory samples are required, even without obvious contamination. Confirmatory sampling and analysis using EPA method(s), such as 5035/8260B would need to be conducted? It appears that PID cannot be used for delineation of contaminated soil without additional confirmatory sampling.

May 2004

Question:
Site specific analysis can still result in SHS. Does this mean that I can change some J&E input parameters and as long as resulting risk is <10-5 and HQ<1, I can qualify for SHS?
Answer:
Yes, one can do a site-specific analysis in the vapor screen matrix within the context of complying with the Statewide Health Standard as long as the risk range is 1.0E-05 and HQ <1.0, (on a substance by substance basis), and using the same toxicological factors as specified in Chapter 250, Appendix A, Table 5 (relating to Physical and Toxicological Properties of substances).
The Land Recycling Program has confidence in the J&E model as an analysis tool under the Statewide health standard, even when site-specific parameters are used. The objective should be to present values and the associated justification for, that are reasonable (and have built-in a safety factor) for the site-specific situation as determined by the environmental professional. In some cases it is advisable to provide site-specific measurements for input for the J&E analysis. This means that if a non-default value for a parameter is chosen, that parameter should be determined by best professional judgment (along with rationale) including a safety factor, or be directly or indirectly measured along with a re-analysis of other parameters which may vary from the default if the chosen parameter is indeed changed (e.g. the "crack area" is modified based on site specific measurements in the building--Then the soil-building pressure differential is assumed to be changed and a reasonable value with safety factor utilized.). If any of the seven sensitive J&E parameters listed below are changed, the DEP is particularly interested that careful analysis and clear justification be made for the new values. This analysis can optionally can be done through calibration with soil gas analysis data. The Land Recycling Program will be monitoring the use of site-specific data on sites and if determined necessary, will offer more guidance in the future.
J&E Sensitive Parameters
Soil Water filled porosity/Capillary Zone Soil water filled porosity/Thickness of capillary zone/Average vapor flow rate into a building/Soil vapor permeability/Soil to building pressure differential/Crack to total area ratio

Question:
If I do site-specific analysis for possible future site buildings, do I need to run both slab-on-grade and basement exposure scenarios to ensure no deed restriction?
Answer:
Under the site specific analysis in context with the SHS for an area with no building or a vacant lot, a deed notice would be placed on the property indicating where contamination is located. If a building were to be constructed, it would include a mitigation measure. Yes, both scenarios can be run using the site-specific analysis under SHS.

Question:
Does the DEP have default J&E model input parameters for a basement exposure scenario?
Answer:
The default J&E model input parameters for a basement would be the EPA Draft Guidance for Evaluating the Vapor Intrusion To Indoor Air Pathway From Groundwater and Soils.

Question:
For soil samples with COPIACs or non-COPIACs at concentrations > soil-to-groundwater MSC but from saturated soil - should they be eliminated from further soil evaluations and pass into GW evaluation? Obviously, these saturated soil samples will not emanate vapors.
Answer:
If the saturated soil is determined to be groundwater, then it should pass into the groundwater evaluation. Saturated soils containing contaminants could emanate vapors based on their physical properties.

Question:
If the groundwater is contaminated at a well within 100' of a residence can we use a groundwater model to estimate a concentration under the building and then use the J&E model using the projected groundwater concentration? Not under SHS, but as a valid SSS approach?

Answer:
If the SHS is not going to be used, the SSS approach can be used to conduct fate & transport analysis on the groundwater (using the highest concentration) to predict the concentration under the building and then use the J&E model to predict the indoor air concentration in the building.

Question:
If the J&E modeling is used, and sampling is still required (for confirmation?) when would anybody model? We model to obtain estimates of, say, soil gas concentrations under conditions other than those that are being measured. Therefore, what "other" conditions would be modeled? Seems like modeling would be performed instead of rather than in addition to monitoring.
Answer:
The Land Recycling Program has confidence in the J&E model as an analysis tool under the Statewide health standard, even when site-specific parameters are used. The objective should be to present values and the associated justification for, that are reasonable (and have built-in a safety factor) for the site-specific situation as determined by the environmental professional. In some cases it is advisable to provide site-specific measurements for input for the J&E analysis. This means that if a non-default value for a parameter is chosen, that parameter should be determined by best professional judgment (along with rational) including a safety factor, or be directly or indirectly measured along with a re-analysis of other parameters which may vary from the default if the chosen parameter is indeed changed (e.g. the "crack area" is modified based on site specific measurements in the building--Then the soil-building pressure differential is assumed to be changed and a reasonable value with safety factor utilized.). If any of the seven sensitive J&E parameters listed below are changed, the DEP is particularly interested that careful analysis and clear justification be made for the new values. This analysis can optionally can be done through calibration with soil gas analysis data. The Land Recycling Program will be monitoring the use of site-specific data on sites and if determined necessary, will offer more guidance in the future.
J&E Sensitive Parameters
Soil Water filled porosity/Capillary Zone Soil water filled porosity/Thickness of capillary zone/Average vapor flow rate into a building/Soil vapor permeability/Soil to building pressure differential/Crack to total area ratio

Question:
Can we make an analogy between soil gas and groundwater? That is - can we monitor soil gas at the downgradient (with respect to groundwater) property boundary rather than offsite? If the soil gas at the property boundary is below MSCs can we assume that soil gas further removed from the site will also be below MSCs - and thus avoid offsite sampling?
Answer:
No, if the SHS is being used soil gas is not to be monitored at the property boundary. Soil gas samples are to be collected closest to the source exhibiting the highest concentration (e.g. on-site) and at the receptor (e.g. off-site). This would represent current and future conditions. One must consider plume stability and movement and the possible vapor impacts now and into the future.

Question:
If we have SPL within 100' of a building, but it is moving laterally to the building - and the SPL is not adjacent to the building - ad the groundwater has greater than 5' between it and the building is it screened out? If not, what do you suggest as a way to develop a site-specific standard?
Answer::
If there is SPL within 100 feet laterally of a building, regardless of the movement, you would have to sample soil-gas or indoor air or conduct a site-specific analysis and/ or mitigate under the vapor screen.

Question:
IAQ - 2 samples collected, one pass, one fail. What should I do?
Answer:
You need to consider the potential background concentrations for the indoor air due to the sources other than the subsurface vapor intrusion. If you cannot pass the screening values in Tables 1,2, 4 and 5 of the guidance, you can still consider soil gas sampling, site-specific analysis or mitigation options under the Statewide Health standard.

Question:
You mention odor thresholds are found to be higher than MSCs about 90% of the time. What are the constituents making up the remaining 10%?
Answer:
The constituents that have odor thresholds lower than the MSCiaq are found in Table 3 of the guidance. The vapor guidance does not address those remaining 10% of constituents. If odors are present, the remediator is to take the necessary steps to resolve them.

Question:
How do you apply guidance to a former UST pit that has been backfilled with pea gravel?
Answer:
The 5 foot criteria applies to the vertical distance directly underneath the receptor, so a site with a tank pit that has been backfilled with gravel would only fail the criteria if a building was constructed over the pit area. Gravel would not meet the definition of "soil-like material" as defined in the guidance.

Question:
What indoor air quality testing will PADEP accept?
Answer:
The guidance suggests the typical air methods TO-14/TO-15 (see page 50; IAQ Sampling), however other methods are acceptable (i.e. -, Appendix A in guidance) as long as they meet the data quality objectives, analyze for the contaminants of concern, and meet the MSCiaq and detection limits. Also, take into account the background levels when sampling indoor air.

Question:
Is HVAC operation considered?
Answer:
Yes, HVAC operation can be considered as a condition for sampling and can be operating as normal if the situation warrants. Once a mitigation measure or system is in place, documentation is required to measure its effectiveness.

Question:
Should you develop a sampling plan for indoor air sampling?
Answer:
A sampling plan for indoor air should be developed to include, but not limited to, defining the goals, establish data quality objectives, quality assurance/quality control, and sampling methods. Establish communication with all parties involved to avoid problems in sampling efforts.

Question:

How can I address the vapor intrusion pathway under SHS without soil gas survey or indoor air sampling, if soil source is separated from receptor by <5 feet vertically and 95' laterally? Also, how can I achieve SHS vapor with benzene @ 380 ug/kg residential at 5' vertical, 90' horizontally without active sampling?
Answer::
If the contamination is less than 5 feet, the vapor screening values in Tables 1, 2, 4 & 5 do not apply. You can conduct site-specific analysis using vertical separation distance of <5' along with other modified J&E input parameters with proper justifications. Other validated fate and transport model, if available, may be used to account for the lateral movement. Sampling and mitigation are optional choices.

Question:
Please consider this case: 3 gas stations at one intersection. "my" gas stations investigate release and pursues vapor guidance, the other 2 are not doing anything. My site fails screen, has to sample soil gas between source and receptor (90' from my site, no preferential pathways but receptor is 50' from other station with preferential pathways - unknown to me). Now I did the sampling and will be responsible for offsite remediation when in effect a different approach (permission of <5' vertical, <100' horizontal) would have prevented this.
Answer:
You can still consider to conduct site-specific analysis under the Statewide Health standard using modified J&E input parameters with proper justifications. Other validated fate and transport model, if available, may be used to account for the lateral movement from your property. Other potential sources have to be investigated and reported to the Department which has responsibility under the Storage Tank Act and regulations.

Question:
The vapor guidance is a good first step. Please work with us consultants to modify.
Answer::
The Department is always open to comments on our guidance documents. Any changes to this guidance will be issued for public comment prior to being incorporated into the guidance.

Question:
In the guidance documents I saw no reference to the applicability of syringe type samples for soil gas testing, yet in the presentation it was stated that they are acceptable. It is our concern that this type of sampling is neither regulated, validated nor accepted by EPA as generating quality data. Please explain your position.
Answer:
Gas-tight syringes for soil gas sampling are acceptable and are often used in real-time sampling with direct injection into a portable field GC. See MADEP guidance that is referenced in our guidance. Gas-tight syringes in conjunction with the evacuated glass vials are acceptable for field hot-spot determination only with direct injection into a portable field GC on-site analysis.

Question:
Appendix A of the guidance document states analytical methods and collection media. In the presentation it was stated that syringes were an acceptable sampling method. Syringes do not allow for proper analysis of samples by TO-13, TO-14, or TO-15. How can this be an acceptable sampling media?
Answer:
Syringes are not a sampling media. They are collection devices that are used for real time sampling and analysis in the field. Syringes are not allowed for proper analysis by TO-13/14/15.

Question:
Naphthalene falls between VOC and SVOC scans- requires 2 analyses - some labs list it in one scan - any thoughts?
Answer:
Naphthalene does fall between a VOC & SVOC. We do not require two analyses for naphthalene, however it is imperative to consult with the laboratory as to method selection and analysis and as long as the detection limits are achieved.

Question:
If COPIACs present at my site, do I have to sample soil gas or indoor air directly? Or do I have any other option?
Answer:
One can use the J&E screening values as long as one has the separation distance of > 5 feet of soil-like material.

Question:
If vapor source is within 5' vertically from the basement floor, what options do I have in Step 2 of the decision matrices?
Answer:
If the vapor source is within 5 feet vertical distance from the basement floor, sample the soil-gas or indoor air or conduct a site-specific analysis under SHS.

Question:
For saturated soil, which is in groundwater aquifer, do I have to use the soil screening values in Tables 4 and 5? Or the groundwater screen using Tables 1 and 2 is sufficient?
Answer:
If this is "saturated" soil and this is defined as groundwater, then use the GW Tables 1 & 2 in the guidance.

Question:
Is the vapor screen applied to pre-remedial or post-remedial conditions of the site?
Answer:
The vapor screen can be applied to either pre-remedial or post-remedial conditions.

Question:
I have 7 years of groundwater data. How do I apply the requirement to use the maximum concentration in groundwater screen for vapor intrusion?
Answer:
Use the most recent 1-year of groundwater data and apply the highest concentration.

Question:
The groundwater plume edge is within 100' laterally from the receptor, but the location of the maximum concentration is more than 100' away from the receptor. How do I apply the requirement to use the maximum concentration in groundwater screen for vapor intrusion?
Answer:
You would have to consider plume stability (current & future) with fate and transport analysis to determine the highest concentration that could be within the 100-foot radius.

Question:
The indoor air data exceeded MSC but soil gas data are less than 100 x MSC. Does pathway present negligible risk?
Answer:
You have the option of using either the soil gas data or the indoor air data.

Question:

What is the definition of vapor source for both >5' and <5' vertically from the receptor?
Answer:
The vapor source is the contaminated soil or groundwater with volatile constituents at concentrations equal to or above the limits related to PQLs as specified in 25 Pa. Code, Section 250.4 at a depth less than 5 feet beneath a receptor. Soil or groundwater at concentrations exceeding the acceptable levels specified in this document constitute the source if present at a depth of greater than five feet below or within 100 feet of a receptor.

Question:
Could you provide some examples of preferential pathway?
Answer:
A preferential pathway is defined as a natural (e.g., shallow rock or vertically fractured soil) or manmade (e.g., buried utilities) feature that creates a sufficiently direct pathway from a source to a receptor to make the use of the default model for predicting indoor air concentrations unacceptable. Such pathways must be shown to significantly reduce the ability of the natural environment to attenuate the concentrations of VOCs at any point from the source to the receptor and to do so in a manner or to an extent that is not accounted for in the model assumptions and would substantially alter the default model's accuracy in predicting conservative indoor air concentrations. Shallow utilities buried at a depth that is insignificant with respect to the column of soil between the slab and the source do not automatically constitute a preferential pathway, nor should this definition include surface paving outside the building or the presence of crushed stone beneath the slab as normally placed for slab foundation material. If such a feature does not pass through the source, it must occur within 30 feet of the source in order to constitute a potential preferential pathway.

Question:
Are monitoring wells suitable for soil gas sampling?
Answer:
Monitoring wells are not suitable for soil gas sampling.

Question:
What's the minimum purging time before taking soil gas samples?
Answer:
The minimum purging time should be determined based on one to three purge volumes to flush the probe and sampling line.

Question:
Where to determine the maximum concentration for the vapor screen?
Answer:
Maximum is based on the site characterization for groundwater and soils that occurs within 100 feet of the receptor both current and future.

Question:
It may be problematic to vent the house during winter season before taking the indoor air samples.
Answer:
If it is problematic venting the house during the winter season, then there is the option of taking the soil gas sample.

Question:
My site fails the soil gas screen but passes the groundwater and soil screen. Am I out?
Answer:
If you pass the groundwater and soil screen of the matrices, then the vapor pathway presents a negligible risk and there are no further IAQ concerns.

Question:
How deep should the soil gas samples be collected?
Answer:

Soil gas samples should be collected as close to the source as possible and at a minimum depth of 5 feet.

Question:
Could you specify the minimum sampling requirements for soil gas and indoor air?
Answer:
We do not specify a minimum number of samples. These numbers will vary based on characterization data, vertical profiling, and receptors. We have not developed specific guidance of our own but refer to the Mass. DEP guidance.

Question:
Groundwater contamination includes multiple regulated substances. Is the plume delineation on a substance-by-substance basis?
Answer:
Yes, this is based on a substance-by-substance basis. This is consistent with the application of other MSCs under SHS.

Question:
Benzene is the only substance that fails the screen in soil or groundwater. Do I take soil gas or indoor air samples for benzene only?
Answer:
Yes, if you fail the screen for only one constituent then you only need to sample for that constituent. If the characterization information proves otherwise, then look for other constituents.

Question:
Can I use alternate model instead of Johnson-Ettinger model for site-specific evaluation on the vapor intrusion pathway?
Answer:
Yes, another validated model can be used other than the J&E model provided that all input parameters are justified and a copy of the model is given to the Department to review.

Question:
How to conduct Johnson-Ettinger modeling with a source that is laterally 99' away from the receptor?
Answer:
The J&E model is not for lateral transport of vapors, only vertical. In order to be conservative, the J&E model places the vapor source under the receptor and models it vertically. Other validated fate & transport models may be used to account for lateral transport and to provide inputs to the J&E model.

Question:
Are the TCE screen values in the vapor guidance based on the toxicity values in Table 5 of 25 Pa. Code Chapter 250, Appendix A?
Answer:
The TCE values are based on toxicity values contained in Chapter 250/ Act 2.

Question:
The indoor air samples pass the screen, but the groundwater plume is moving toward the building. The fate and transport analysis indicates that future indoor air intrusion could be getting worse. Am I out?
Answer:
No, if the fate and transport indicates that in the future the vapor screen will fail, that will have to be evaluated

Question:

Definition of a separate phase liquid….10,000 mg/kg of each component or is it for a product such as diesel?

Answer:

Separate Phase Liquid is the total constituents of 10,000 mg/kg. See the definition of SPL in the Vapor Intrusion Guidance document, page 52.

Vapor Intrusion Guidance, page 52

Question:

N reference to QA/QC requirements for canister sampling, can you explain a field blank and duplicate sample?

Answer:

In each sampling study, at least one clean sampling device (i.e., canister) should accompany the samples to the field and back to the laboratory to serve as a field blank. In the case of a canister, the canister is taken to the field and back to the laboratory without opening it.

The duplicate sample is two or more samples collected simultaneously during each sampling event. These are typically collocated and at locations where upscale but not offscale values are to be expected.

Question:

Is the analytical method for Summa canisters TO-14 or TO-15? There are significant quality control differences between them.

Answer:

The TO methods were developed for ambient air studies but can easily be adapted for use in conducting air studies. TO-14 and TO-15 methods are the most commonly used methods as well as others (e.g. TO-1, TO-2, TO-17) for indoor air measurements. The remediator must carefully choose the appropriate the analytical method that will meet the data quality objectives of the site characterization.

Question:

Does a complete IAQ analysis have to be included in all Site Characterization Reports under Chapter 245? If so, will there be some softening of the 180-day requirement?

Answer:

The IAQ analysis must address the contaminants of concern that are related to the release. The IAQ analysis is to be submitted with the Site Completion Report; there is no extension of the 180-day requirement.

Question:

Is a mobile home (on blocks w/ a crawl space beneath) considered an “occupied space”?

Answer:

The crawl space is not an occupied space, however it constitutes a potential source, unless it is open to the outside.

Question:

If fractured bedrock is within 30 feet (i.e., less than 30 feet of soil) of surface, is this a preferential pathway?

Answer:

Fractured bedrock is a preferential pathway if the fractures pass with 30 feet of the source and pass directly through the receptor. See the definition of a vapor source in the guidance document (Vapor Intrusion Guidance, pg. 53).

Question:

For groundwater, if COPIACs present exceed the groundwater MSC but non-COPIACS meet nonuse aquifer MSCs, do you just ignore the COPIACs or may they be compared to nonuse MSC? (as with non-COPIACs)? Or can the nonuse aquifer MSC option not be used for COPIACs?

Answer:

No, the COPIACs are not ignored because the screening process is applied to each regulated substance individually. The options available for COPIACs under the "*determine if a potential pathway exists*" option in the GW matrix are all but the second option, that of comparing to the nonuse aquifer MSC. The nonuse aquifer MSC option under the "*determine if a potential pathway exists*" of the GW matrix is not available for COPIACs and only available for non-COPIACS.

Question:

If the source of contamination is >100' from the receptor, must you still perform soil gas sampling in the area of the source w/ the highest concentration?

Answer:

If the vapor source (as defined in the guidance, Vapor Intrusion Guidance, pg. 53) is > 100 feet from the receptor, the pathway is incomplete or presents negligible risks and there are no further IAQ issues.

Question:

Can all the soil gas and IAQ sampling be foregone by installing a radon mitigation system and still receive release of liability under Act 2?

Answer:

Yes. Mitigation is allowed in place of conducting the screen. However, documentation that the mitigation is effective must be provided.

Question:

I need some additional clarification on sites where depth to water is less than 5'. Do you automatically default to site-specific or how may you stay with Statewide health?

Answer:

If contamination is less than 5 feet, the screening values do not apply. Soil-gas or indoor air would have to be sampled or the site-specific analysis may be conducted (which is still considered to be under the Statewide health standard).

Question:

For soil, if a COPIAC is present, must you automatically evaluate the next steps for potentially complete pathways if one of the other options under pathway determination applies?

Answer:

For COPIACs in soil, all options are available under the pathway determination portion of the soil matrix, with the exception of the comparison to the soil to groundwater value, which is available only for non-COPIACs. One is not automatically put into sampling in "*next steps for a potentially complete pathway"* of the soil matrix.

Question:

Can you clarify "2 quarterly" samples - 2 samples for each of 2 seasons?

Answer:

For indoor air sampling, one sampling event must be collected in the spring and one on winter (Vapor Intrusion Guidance, see pg. 37). For soil-gas sampling (Vapor Intrusion Guidance, see pg. 38), one must collect a sample in the spring and winter however; one can collect two soil-gas sampling events within the same season as long as they are 2-4 weeks apart.

Question:

Is the J&E model applicable for preferential pathway sites? If not, just do sampling (indoor air) and compare to MSC_{IAQ}? Or are there other options?

Answer:

The J&E model is unreliable for preferential pathway vapor lateral transport. If preferential pathways exist, one conducts soil-gas or indoor air sampling or chooses the site-specific option which one can apply the modeling of the vapors that are vertically emanating into the occupied building.

Question:

How does the new vapor intrusion guidance apply to special industrial areas?

Answer:

The vapor guidance applies if the vapor pathway presents an imminent, immediate, or direct threat that would prevent the property from being used for its intended purpose.

Question:

If a SPL is identified in either the soil or groundwater at a site, but has no MSC in the Act 2 tables, are further IAQ issues required?

Answer:

If a regulated substance does not have an MSC in the tables in Appendix A to the regulations, then the Statewide health standard is not available for that substance, and a remediator must attain either the background or site-specific standard. The vapor screening guidance only applies to the Statewide health standard.

Question:

Please confirm if a winter-04 and then a spring-05 IAQ or soil gas sample schedule is required for example, or can a spring-04 event be followed by a winter-04-05 event.

Answer:

Either one of those scenarios is acceptable as long as the ambient air temperatures are lower than the soil temperature.

Question:

Would PELs apply to sites that operate as a gas station/convenience store and does not include a garage/service area?

Answer:

It is our understanding that the OSHA PELs would not apply to a gas station being that gasoline is a product that is being dispensed.

Question:

Is there any way to convert passive soil gas measurements to concentrations (weight/volume)?

Answer:

Typically air concentrations of VOCs can either be expressed as mass per unit volume or as volume of gas per volume of air. The conversion is:

mg/m3 = ppmv * Molecular Weight/24.45

Question:

Do the tables reflect no-exceedance? If so, would it be possible to pass 75%/10x but fail vapor screening for the same MSC_{IAQ}s?

Answer:

When screening groundwater and soil concentrations, the decision to proceed in the screen is based on a non-exceedance rule, NOT the use of the 75%/10x rule. Sampling requirements for vapor are not limited to the point of compliance as is demonstration of attainment.

Question:

Also, if groundwater attainment is for 4 or 8 quarters, do you obtain the max levels for vapor screening from the full 4 or 8 quarters, or just the last events?

Answer:

Use the maximum concentration that was found in the most recent samples of all characterization wells that are no older than one year.

Question:

If groundwater is less than 5 ft bgs, matrix can't be used and soil gas/indoor air samples are needed. However, soil gas sampling must be collected >5 ft bgs to avoid ambient air short-circuiting. This scenario excludes use of matrix? (tough to collect soil gas from saturated zone?

Answer:

If groundwater is encountered < 5 feet, the soil gas sample will have to be collected <5 feet. Soil gas samples collected < 5 feet must be sealed in a fashion to prevent ambient air from short-circuiting the sample. As another option, an indoor air sample can be collected.

Question:

API recommends collecting soil gas samples nested at different depths, and evaluating worst case future and current use through the deepest probe over the hot spot. PADEP is requiring many more samples, why can't the worst case sample (closest to hot spot) be the only sample collected to evaluate future and current under PADEP as API recommends?

Answer:

A soil gas sample closest to the source (hot-spot) is recommended, however it is recommended to obtain a vertical profile to confirm a concentration gradient from high to low.

Question:

Please provide clarification on preferential pathways. Is gravel sub-base (under asphalt) a preferential pathway? Guidance definitions suggest it isn't, unless within 30 ft of source. If this is true, ALL UST sites will be required to do soil gas/indoor air sampling. Preferential pathway evaluation seems to be the most subjective part of this process. There seem to be inconsistencies between evaluating gravel sub-base, shallow bedrock, and sandy soils as preferential pathways.

Answer:

The guidance indicates that the presence of crushed stone beneath a slab (or asphalt in this case) is not a preferential pathway. [See Vapor Intrusion Guidance, Preferential exposure pathway definition pg. 51 & 52]

Question:

MSC exceedances in soil and groundwater for MTBE, yet release of liability granted (SHS). Southeast region asked why release was given, with MTBE contamination. Answer received: organic compounds no longer regulated under Act 2 if contaminant source is UST. New regs separating Act 2 & 250?

Answer:

The attainment tests used under the Statewide health standard do allow for exceedances of the selected standard. Organic regulated substances are regulated under Act 2 for regulated tanks, and the Act 2 standards do apply.

Question:

If a site initially has exceedances in soil vapors, but is then excavated or remediated, is there a requirement, like soils, where a certain number of samples must be below limits (i.e., 8 quarters of clean data)? Or is one set of clean values enough?

Answer:

The vapor screening may be conducted using the highest concentrations found in the most recent sampling events. Including post-remediation sampling. This screening uses the no exceedance rule, not attainment tests like the 75%/10X rule which allow some exceedances of the screening value.

Question:

Are there plans to make the guidance for vapor intrusion from groundwater and soil under Act 2 into a regulation? If so, what is the time frame?

Answer:

Yes. The time frame is currently estimated at five years.

Question:

Define "source" as in does a preferential pathway pass through or within 30' of a source.

Answer:

The following definition of vapor source (see Vapor Intrusion Guidance, pg. 53) is found in the guidance document: The vapor source is the contaminated soil or groundwater with volatile constituents at concentrations equal to or above the limits related to PQLs as specified in 25 Pa. Code, Section 250.4 at a depth less than 5 feet beneath a receptor. Soil or groundwater at concentrations exceeding the acceptable levels specified in this document if present at a depth of greater than five feet below or within 100 feet of a receptor.

Question:

Site - VOCs, no NAPL, nonuse aquifer. How do you assess potential vapor (IAQ) risks to residential properties upgradient of site? The potential pathway is through impacted groundwater entering a combined sewer/storm sewer that passes through an area of contamination prior to entering POTW.

Answer:

The criteria in the matrices apply regardless of the direction from the receptor. If the source is within 100 ft of the receptor in any direction, the pathway is potentially complete and must be evaluated.

Question:

Some slides in notes (handouts) are too small to read text. Are or can these be made available on web?

Answer:

A copy of the PowerPoint presentation is available on the Land Recycling web site.

Question:

Can you restate the lack of applicability for vapor evaluation under background standard?

Answer:

Background is the concentration of a regulated substance present on a site that is not related to the operations carried on that site. Demonstrating that the regulated substances on the site meet this criterion is sufficient to demonstrate attainment of the background standard. This is not a health-based standard. The vapor screening process presented in the guidance applies only to the Statewide health standard.

Question:

Ventilation of homes for 24-hour period when sampling indoor air. Is this done prior to or during the acquisition of the indoor air sample?

Answer:

Ventilation of the home must be done prior to the sampling event. The home would then be closed and allowed to equilibrate for 24-48 hours before the sample is taken.

Question:

Can one do a site-specific analysis (Option B) in next steps for a potentially complete pathway of the vapor screen matrix within the context of complying with the Statewide health standard and if so, what information does one have to present to justify J&E parameters other than the default values?

Answer:

(Part 1): Yes, as long as the risk range is 10E-05 and HQ <1.0, (on a substance by substance basis), and using the same toxicological factors as specified in Chapter 250, Appendix A, Table 5 (relating to Physical and Toxicological Properties of substances).

Part (2): The Land Recycling Program has confidence in the J&E model as an analysis tool under the Statewide health standard, even when site-specific parameters are used. The objective should be to present values and the associated justification for, that are reasonable (and have built-in a safety factor) for the site-specific situation as determined by the environmental professional. In some cases it is advisable to provide site-specific measurements for input for the J&E analysis. This means that if a non-default value for a parameter is chosen, that parameter should be determined by best professional judgment (along with rational) including a safety factor, or be directly or indirectly measured along with a re-analysis of other parameters which may vary from the default if the chosen parameter is indeed changed (e.g. the "crack area" is modified based on site specific measurements in the building--Then the soil-building pressure differential is assumed to be changed and a reasonable value with safety factor utilized.). If any of the seven sensitive J&E parameters listed below are changed, the DEP is particularly interested that careful analysis and clear justification be made for the new values. This analysis can optionally can be done through calibration with soil gas analysis data. The Land Recycling Program will be monitoring the use of site-specific data on sites and if determined necessary, will offer more guidance in the future.

Question:

For sites with many years (5+) of groundwater chemistry data, does one exceedance of a standard kick the site into the vapor pathway analysis (when a receptor has been identified - no LNAP present)? For sites that are using the 75/10x rule for closure, what data would be used in the Decision Matrix for groundwater?

Answer:

The vapor screen is done using the site characterization data, not the attainment data. The highest value from the site characterization data is used to determine if the screen is passed or not. When screening groundwater concentrations, the decision to proceed in the vapor screen is based on a non-exceedence rule, NOT the use of the 75%/10x rule.

Question:

Does the vapor guidance have a "depth-to-contamination" (at greater depths) pre-screen that could be used to eliminate the pathway? My site has contaminated groundwater that exceeds the screening vales listed in the guidance but it is at a depth of > 60 feet.

Answer:

No. The guidance does not have a vertical distance to contamination (at greater depths) that would "screen-out" the vapor intrusion pathway. The Department has done extensive conservative modeling of those VOCs listed in the guidance and have found that they should be evaluated regardless of depth.

In the scenario above, according to the vapor guidance, if you exceed the SHS GW standard or J&E screening value at a depth greater than 60 feet, it must be evaluated. That would put you into sampling the soil gas(preferred) or the indoor air. Once you have done that, you compare to the MSC_{IAQ} and at that point it may meet that criteria, putting one out of the vapor pathway without going site-specific.

Question:

If I have a site where I can demonstrate attainment of soil and groundwater MSCs published in the regulations under the Statewide health standard, but a contaminant fails the vapor screen and I choose to do a site-specific analysis under (B) of the decision matrix in the vapor guidance, which Act 2 standard have I met?

Answer:

Conducting a site-specific analysis is one option under the guidance for the Statewide health standard, and therefore you have attained the Statewide health standard, not a combination of standards.