

## The Environmental Corner

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### Vapor Intrusion Assessments: Can You Trust Your Indoor Air Data?

If you've ever had to hire an environmental consultant to investigate your property and collect samples, you've probably had to look at an analytical report from a laboratory and use it to answer some pretty important questions. Is there contamination on my property? What chemicals are present? How much is there? Most importantly, are the levels of contamination high enough to be causing harmful health effects? Only slightly less importantly, are they high enough to require a costly cleanup? You needed to know the answers to all of these questions so that you could sell or buy a property, get a business loan, or maybe just to sleep at night. With today's trend of highly regulated vapor intrusion (VI) assessments being required at sites where dry cleaning with perchloroethene (PCE) has taken place, these questions have become increasingly important and more difficult to answer.

While there are challenges as-

sociated with environmental assessments of all kinds; determining the level of hazardous constituents in a building's indoor air, assessing from where it may have come and evaluating if an unacceptable health risk exists for human occupants can be particularly delicate. For those property owners who need answers to the questions posed in the situation above, it is extremely important that samples of indoor air collected during VI assessments are representative of the air actually being breathed by

the building's occupants and that the laboratory results can be relied upon.

#### Location

To design a good indoor air sampling plan, it is very important to understand the way in which airborne contaminants are dispersed and move about within a building's spaces. Given a single source of indoor air contamination, such as a crack in a concrete floor that allows in impacted subsurface vapors, the concentration of the contaminant will slowly disperse over time throughout the entire indoor space. Think of how

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when a teabag is introduced into a cup of hot water there is initially a concentrated area of tea nearest the teabag itself (the source), which eventually spreads throughout the entire cup. Contaminants spread throughout indoor air in a similar fashion.

With this in mind, it makes sense that the concentration of indoor air contaminants should be highest closest to the source, which should be fairly straightforward to identify. That is true in a very few situations. But in most other cases, interior walls, closed interior doors, open exterior doors and windows and many other factors affect the dispersion process. As a result, one or two indoor air samples collected from within a building may not yield very useful information if you're not careful. The placement of sampling locations has the ability to make or break an indoor air sampling event conducted as part of a VI assessment.

### **Background**

Prior to the initiation of indoor air sampling, an inspection of the area must be conducted to identify and inventory materials that could potentially contribute to indoor air conditions that may be unrelated to VI issues. Many common items such as commercially available cleaners and degreasers; small quantities of small engine fuel; furniture polish; cigarette smoke; building materials such as cured floor sealants, carpeting, glued furniture, paint lacquers; and, household products such as disinfecting materials, cosmetics, hobby products, etc. can affect the quality of indoor air in buildings. Suspect items identified during the inspections should be listed on a pre-sampling

inspection form for later reference and a request must be made for their removal prior to sampling.

Many of the chemicals of concern being evaluated during VI assessments are also already present in outdoor ambient air as a result of urbanization or industry. Recent studies by the EPA have shown that some chemicals, such as PCE and Benzene, are present in the ambient outdoor air in urban areas at concentrations that are higher than the human health screening levels for residential scenarios. When the outdoor air carrying these chemicals migrates into buildings where VI assessments are underway, the resulting data can be affected. Without a thorough assessment of background conditions, data collected during indoor air sampling events can become useless.

### **Maintain Control**

Indoor air samples are typically taken over an extended period of time to provide a time-weighted average concentration for comparison with screening levels. Samples collected within residential structures usually are taken over a 24-hour period to represent continuous occupation. Samples collected within commercial or industrial facilities are taken over an 8-hour period to mimic the standard work day. When the sampling devices are placed and sample collection begins, the environmental professional usually sticks around for a short period of time and collects a few additional readings, but there is a large amount of time during normal sampling events where there is no control over what goes on around the sampling device.

Happenings could occur during

the course of 24-hours that may impact indoor air sampling results. For example, if someone opens a window to let in some fresh air for an extended period of time, the results would likely be artificially biased too low for good use in a VI assessment. Although the sample results would accurately represent true conditions during the time of sampling, it would not represent worst-case conditions that exist when all windows are closed. If someone brings home their drycleaned clothes and places them in the same room as an indoor air sampling device, the concentration of the drycleaning solvent used would be higher than anticipated. The health based screening levels for chemicals such as PCE are extremely low and it doesn't take much to affect the analytical results at these trace concentrations.

Controlling conditions during indoor air sampling events is a sensitive matter since it usually involves limiting the behavior of building or house owners and occupants who are probably already feeling a bit put out. A pragmatic approach is necessary, however, to get an accurate assessment of indoor air conditions during VI investigations.

There is a significant amount of time and money required to collect and analyze indoor air samples at and near environmental cleanup sites. Since the regulatory requirements to do so are still fairly new there are many inexperienced people performing these assessments. Before you hire someone to help you understand the potential VI exposure pathway at your cleanup site, or your building that is located near a cleanup site, make sure that your money will be well spent.