

# The Commercial Record

Connecticut's Weekly Business Newspaper Since 1882

A PUBLICATION OF THE WARREN GROUP

## Identify and Control Intrusion Of Harmful Vapors in Buildings

By Paul Tanner



If you have recently purchased a house in New England you likely know that radon is a naturally occurring – yet cancer-causing and radioactive – gas that can accumulate in homes. When present at high concentrations,

radon poses a serious health hazard and health officials recommend testing indoor air for radon before moving to a new location. When test results exceed a certain value, the influx of radon through the foundation must be controlled, typically by installing an under-building venting/depressurization system. This can be quite a concern for the buyer and headache for the seller.

Like radon, other volatile chemicals such as those in gasoline, heating oil and solvents can also degrade indoor-air quality. When this happens it can cause bad due diligence surprises during real property transactions and have a negative impact on property values. Vapor intrusion is the term generally used to describe volatile organic compounds (VOCs) entering a building from underground. The VOCs can move from polluted soil or groundwater up through the soil and ultimately through a building foundation, thereby impacting indoor-air quality.

The good news is that VOC vapor problems often can be managed with up-front

PAUL TANNER is a licensed environmental professional and senior project manager at Springfield, Mass.-based O'Reilly, Talbot and Okun Assoc. ([www.oto-env.com](http://www.oto-env.com)). He is responsible for environmental site assessment and remediation in the firm's Manchester office.

planning and simple control measures. Here are some basic points to consider when evaluating your property's risk factors for vapor intrusion.

### Environmental Due Diligence

A pre-purchase due diligence assessment is your opportunity to identify areas where VOCs have been used. Your environmental consultant uses this information to assess whether VOCs are likely to impact indoor-air quality. The consultant uses historical maps, street directories, underground tank records and the history of past site uses in the assessment. Questionable areas, such as those used for fuel or chemical storage, may be targeted for drilling, sampling and laboratory analysis during a Phase II Assessment, which, if needed, may be more fully mapped during a Phase III assessment.

The Connecticut Department of Environmental Protection has set safe VOC standards for groundwater and soil vapor. These standards are contained in the Connecticut Remediation Standards (RSRs) and are termed "volatilization criteria." In 2003, the DEP proposed more stringent volatilization criteria and, although they have not been finalized, the DEP expects owners to use these proposed standards in evaluating vapor risks. The criteria typically are applied in the following sequence: Test results for groundwater samples collected from adjacent to the subject building are compared to the RSR volatilization criteria and, if groundwater RSR volatilization criteria are exceeded, more detailed testing and assessment involving the RSR soil vapor volatilization criteria is needed.

The DEP's volatilization criteria were calculated based on uniform reasonable assumptions regarding soil type, depth to groundwater, building construction and chemical toxicity. When test measurements

from a particular property exceed the groundwater or soil vapor volatilization criteria, this suggests a possible health risk due to the contamination of indoor air.

When the comparison suggests a possible risk, it is prudent to refine the assessment by calculating site-specific volatilization criteria. Any site's specific conditions are likely to differ from the "default assumptions" built into DEP's criteria. It could be that the soils are less permeable, the water table is deeper, and the concrete slab is thicker than the default assumptions. Because DEP's criteria are intended to err on the side of caution, even when the generic volatilization criteria are exceeded, actual site risk may still be low.

### Indoor-Air Sampling

Collecting indoor air samples for laboratory testing can tell you if indoor air is impacted with VOCs. If the groundwater or soil vapor volatilization criteria are exceeded, it makes sense to test the indoor air to confirm it is safe to breathe. However, indoor-air sampling can be tricky, because there may be a number of other sources of VOCs to the indoor air that need to be taken into consideration. For instance, if there are previously opened cans of paint, lubricants, clothes from the dry cleaners, or power equipment stored in the building, it is possible that these sources are contributing measurable amounts of VOCs to the indoor air. The consultant needs to take steps to understand the possible other sources of VOCs measured in indoor air.

Even when VOCs are present in groundwater and soil vapor under the building at concentrations greater than DEP volatilization criteria, it is not uncommon to find no measurable VOCs in indoor air. In this case, the pathway of vapor movement may be impeded by the building or site specific conditions. In these cases the Connecticut DEP

*Continued on Next Page*

*Continued from Previous Page*

recommends a watchful management approach, where a monitoring plan is in place (and includes a contingency plan of actions should VOCs be detected), indoor air samples are collected and analyzed on a set schedule, and annual reports are provided to the DEP.

Where new construction is involved, an engineer or architect can evaluate placing the building away from the VOC-impacted area. For construction over known or suspected VOC-impacted areas, physical barriers (membranes or spray-on barriers) can be integrated into the foundation plan. Piping can be installed below the barrier to actively remove vapor by electric blower or wind power. These steps allow contaminated property to

be developed while eliminating future risks to building occupants.

**Mitigation of Vapor Issues**

In cases where existing buildings have a vapor intrusion problem, sub-building ventilation and depressurization systems can be installed to prevent movement of vapors from the soil into the building foundation. These systems can be as simple as low-vacuum systems (often used for radon gas), designed to slowly collect and vent vapor to the outdoors. In other cases, a high-vacuum vapor-extraction system is needed to remove the source of VOCs in soil and de-pressurize the foundation. Changes in the building's HVAC system can be incorporated to create a positive pressure in the building atmosphere, effectively

countering the tendency of soil vapor to enter the building. In some cases, a composite barrier and sub-building ventilation system is the best solution, where the existing floor can be removed, a vapor extraction system and overlying barrier membrane is installed and the floor replaced to provide three layers of protection for indoor air.

Environmental risks to developed properties are now recognized as including the possibility of contaminant vapor migration from underground sources. Ignoring this potential problem during the due diligence process may set the stage for expensive investigations and repairs later. By including an appropriate assessment of this possible problem up front, the diligent property owner can minimize the possibility of surprises later. ■