

## **Report on the National Stakeholders' Panel on Vapor Intrusion**

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In the evening of March 12, 2008, five community stakeholders presented to a roomful of more than one hundred vapor intrusion professionals at the National Stakeholders' Forum on Vapor Intrusion, sponsored by U.S. EPA in conjunction with the Association for Environmental Health and Sciences Spring 2008 meeting in San Diego. Each stakeholder represented a neighborhood contaminated with volatile organic compounds (VOCs). Written answers from four of the stakeholders—to questions provided by event organizers—were handed out. The community presenters were Debra Hall from Hopewell Junction, New York; Bruce Oldfield from Hillcrest, New York; Mary Moore from Phoenix, Arizona; Jane Horton, from Mountain View, California; and Robert Dorr, from Providence, Rhode Island.

The event provided an unusual opportunity for consultants, government officials, and others to hear from the people directly impacted by vapor intrusion contamination, investigation, and response. The speakers were selected for their level of experience; they demonstrated a technical sophistication not normally found when the vapor intrusion question is first introduced into any community. Despite the late hour, the audience was attentive. In general, evaluations showed that the audience was impressed by the stakeholder presentations. For many, this was an unusual opportunity. One evaluator explained, "I have been in the VI industry for over 6 years and [have] never seen the personal side of my industry." A number of evaluators expressed concern that too much time was spent on the background/introductory portion of the evening's agenda.

Bruce Oldfield, of the Hillcrest Environmental Action Team, summarized the community attitude: "VOCs in our homes are no different than having a killer enter our homes unbeknownst to us. We did not bring them into our homes, we do not want them in our homes." He explained that the vapor intrusion investigation in Hillcrest was apparently triggered by the New York State Department of Health's recognition of an unusual, elevated pattern of childhood cancers in his neighborhood.

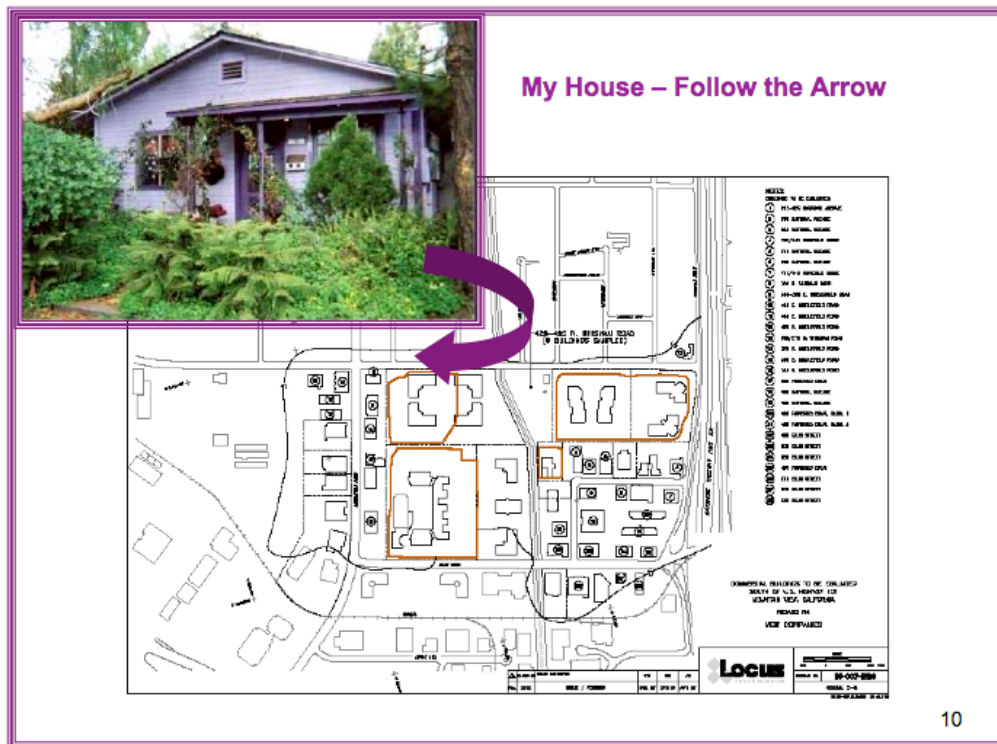
Mary Moore is a leader of the Lindon Park Neighborhood Association and a member of the EPA-sponsored Community Advisory Group overseeing the cleanup of the Motorola 52<sup>nd</sup> Street Superfund site. She expressed frustration that 19 years after listing on the National Priorities List, the site still has had no vapor intrusion studies. A work plan for a Vapor Intrusion Risk Assessment for Operable Unit 1 was submitted in September 2003, but nothing has been done. Moore said she was told that the delay was because U.S. EPA has no finalized vapor intrusion guidance. The Arizona Department of Environmental Quality is lead regulator for that Operable Unit.

Robert Dorr, leader of the Adelaide Avenue Environmental Justice Coalition, which oversees the cleanup of the former Gorham Silver property. Textron Inc. is the

responsible party, but it no longer owns the land. The property currently contains an abandoned supermarket with elevated levels of VOCs and a high school, under construction. He warned that large contaminated properties, such as Gorham Silver, often wind up owned by local governments and are likely to be used for public structures such as schools. He reported that regulatory agency employees tried to be helpful, but that their knowledge of the vapor intrusion pathway was not up to date.

Jane Horton, board member of the now disbanded Northeast Mountain View Advisory Council, described her house, on the edge of the Middlefield-Ellis-Whisman Superfund Study Area—the birthplace of the semiconductor industry. Despite a long history of investigation, remediation, and public involvement across the street, her home was belatedly addressed:

Indoor air testing was never offered, discussed, or explained until after I had lived across the street from a Superfund Site for *decades*. Only a slight redrawing of the plume gave me the perceived right to strongly request indoor air testing. At that point the site was 75% remediated, with approximately 75,000 tons of TCE removed, and my home indoor air tested high enough to recommend remediation, which was designed and installed.



Debra Hall, founder of Hopewell Junction Citizens for Clean Water, told how EPA’s mobile real-time sensor, the Trace Atmospheric Gas Analyzer, had been used to test the air in her home. She explained, “the TAGA has the ability to find sources of TCE/PCE and other VOCs other than vapor intrusion. It is also more cost efficient to test

using the TAGA when there are many structures close together.” She also compiled a table showing how TAGA results, just nine days apart, showed dramatically different level of TCE in her indoor air.

**TAGA Results 9 Days Apart**

<b>ROOM</b>	<b>1/26/2004</b>	<b>2/4/2004</b>
<b>Computer Room</b>	3.3PPB-17.72 ug/m3	5.0PPB-26.85 ug/m3
<b>Family Room</b>	3.0PPB-16.11 ug/m3	5.0PPB-26.85 ug/m3
<b>Expansion Joint</b>	17PPB-64.44 ug/m3	8.9PPB-47.25 ug/m3
<b>Game Room</b>	3.3PPB-17.72 ug/m3	3.7PPB-19.86 ug/m3
<b>Laundry Room</b>	3.4PPB-18.25 ug/m3	7.7PPB-41.34 ug/m3
<b>Summa Results</b>		
<b>Summa Downstairs</b>	3.4PPB-18.25 ug/m3	
<b>Summa Sub-Slab</b>	1200PPB-6,444 ug/m3	

### **Communicating with the Public**

The panelists agreed that outreach to people whose homes are directly impacted is different than involving the public at large. Hall warned

Vapor intrusion investigations must be discussed as soon as possible. Residents will be mistrustful if they find out about possible vapor intrusion from a newspaper or television news program. Residents and anyone involved should be sent information, and a meeting should be scheduled so everyone can learn about this together.

Oldfield compared the experiences of two communities in his part of New York:

When vapor intrusion is detected in an area/building, the occupants of the area/building need to be *first* notified in a timely fashion by certified mail or personal contact from the appropriate agency before information is released to the media. In Hillcrest residents were initially, personally notified by mail and/or personal contact from the New York State Department of Environmental Conservation (NYSDEC). Hillcrest residents reported feeling more at ease with

the situation once vapor intrusion issues were broadcast by local media. In nearby Endicott NY, often, impacted residents were not notified and their first information about contamination issues came from a local newspaper and/or television source. Endicott residents who learned about possible contamination issues by watching the eleven o'clock local news were often upset that earlier notification was not available.

He added,

This notification needs to extend beyond the owners of the buildings impacted by vapor intrusion issues to inform employees and lessees of said buildings. The owners of businesses should hold employee meetings to discuss the issues and post a notice of possible contamination and mitigation. Landlords should be responsible for conveying information about possible contamination and mitigation of both commercial and residential rental properties.

Moore warned, however, that information needs to reach more than those people currently affected. She stated, "However, people living adjacent to the contaminated area also need to be notified since VOCs may be migrating off the site by preferential pathways and those adjacent areas should be considered an extension to the source area." She also suggested, "the agencies need to rely on (and support) the local neighborhood groups to assist in conveying this information to the concerned community."

Horton agreed, but she recommended:

Where there is no existing group, the regulatory agency should be *obligated* to help form and support groups.... This is an overwhelming and daunting experience to go through, and without support forming and maintaining groups, people who have already been victimized by faceless polluters still have very few tools to deal with their situation.

She also declared it important that those officials or consultants assigned to take inquiries be adequately prepared:

Only those contacts that represent real persons who actually know what is happening specific to that neighborhood should be listed. Imagine how frustrating it is to be brave enough to finally make that call and then get a voice mail and no one ever returns the call, or to get through to a person who hasn't got a clue about what is happening in that neighborhood!

Dorr called for creative approaches to reach out to communities of color, such as the Dominicans and Cambodians in his neighborhood. He said that extra efforts are necessary to overcome language barriers.

### **Sampling**

The other panelists shared Hall's concern that vapor levels vary over time. They suggested recurring sampling both before and after mitigation. None suggested reliance

on subsurface sampling; they all focused on indoor air, complemented by outdoor and subsurface testing.

Hall explained the benefits of re-testing:

The EPA sampled all homes a year after the original testing, whether they had a mitigation system installed or not. This was helpful for a few reasons. For homes that had systems installed, homeowners had their mind at ease knowing the system was working.... For homes that did not have a system installed, their minds were put to ease that their air continued to be safe.

Based upon the interpretation of groundwater data that had kept her house from being tested—that is, it was just beyond the interpolated plume boundary—Horton suggested:

With all the variability in soils and preferential pathways, it should be mandated that indoor air testing happen for any inhabited building within several hundred feet of volatile organic contamination, and that the perimeter for testing expand outward until no contaminated indoor air is found.

She further explained:

As soon as it is determined that there is contaminated groundwater and that the indoor air has not been tested, all efforts should be made to start the indoor air testing immediately. “Immediately” in these instances does not mean that it happens quickly; canisters need to be available, labs for testing have to be scheduled, and homeowners and testing staff need to coordinate their efforts. With all the steps that homeowners/renters need to do prior to testing to ensure the accuracy of the test, people living in the affected areas really need to be brought on board the process without delay.

Oldfield agreed with Horton:

It is vital that the boundaries of a VOC plume be accurately defined so that occupants of building over this plume are all being cared for. Therefore it is essential that testing be comprehensive enough to discover vapor intrusion that may defy a preliminary geologic model of an underground plume.

### **Mitigation**

Mitigation—such as vapor membranes, radon-type sub-slab depressurization systems, and other forms of ventilation, is important—according to the panelists. They expressed concern, however, that it is offered unevenly. Hall opined:

I think any home that is between two other homes needing mitigation should be mitigated. I have come to that conclusion by putting myself in that person's place. How would I feel knowing that all around me the air is contaminated and my home is not protected should the toxic vapors decide to invade my home? I feel the same way for homes that are considered just outside the contaminated

area. The only way to breathe easy is to clean the plume that is the cause of the contamination.... I still do not understand why agencies decide to monitor and not mitigate should they find contamination since in many cases it costs less to mitigate than it does to monitor.

Oldfield made a similar point:

Under New York State's guidelines, if three homes are located on a toxic plume and the outer homes qualify for mitigation, VOC indoor levels in the middle home may not be high enough during a test to warrant mitigation. The middle homeowner has to suffer unacceptable anxiety during the period between tests to see if the levels may rise to the action level for mitigation. Therefore, to reduce anxiety of residents in a "monitor" phase, any home with vapor intrusion from an outside source should be mitigated. The Hillcrest Environmental Action Team strongly supports blanket mitigation. All homes, schools and businesses on a known VOC plume should be mitigated to ensure against future intrusions of these unwanted toxins.

Each of the presenters from communities with residential mitigation in place described shortcomings. Hall, for example, reported, "For a few homes, the results were not low enough. In this case the EPA was able to reinstall a larger fan, re-test, and then assure residents that their air was safe. Had they not retested, the EPA would never have known that a more powerful fan was needed."

Horton recounted her personal experience:

My home initially had the levels of TCE increase after the first system was installed: My earthen cellar had a system installed that sucked air in from my cellar and out through a newly-made exit hole in the exterior wall, up to an above-roof-gutter vent. However, this design was flawed, and they had to create a system that sucked outdoor air into the cellar as well as blowing the air out; this resulted in TCE levels that were "acceptable," although not "0."

She also discussed the costs of mitigation: "The polluters should have to pay for everything; homeowners with remediation should not have to beg to have these big companies pay for the electricity that is needed to run these fans..."

Oldfield made a more general observation:

Conflicting information about the effectiveness of radon-system-type mitigation systems do not make myself or my neighbors confident that these systems are a long term solution to vapor intrusion problems. Although the [New York State Department of Environmental Conservation] swears that these systems remove toxic vapors, in our climate changes to the subslab and basement walls over time are such that new pathways are likely to open and renew indoor air contamination.

## Source Control

Dorr spoke for the entire group when he warned that there is a danger that those responsible for cleanup “will see mitigation as a permanent substitution for remediation. Mitigation should be temporary.” Moore stated, “However, mitigation is not the answer to the underlying problem. Clean-up of contamination in the soil, groundwater, and/or bedrock, the cause of the problem, is the only real solution.” Horton said, “Polluters need to pay for remediation until the groundwater is clean. The person whose home has been contaminated should not have to pay, should not have to nag, and should not have to be the one making sure that the polluters and the management companies do what is right. Hall agreed, “Mitigation is one thing but the only true way to cut the expense and protect people is to clean the source of contamination.”

Oldfield summarized:

Since new vapor pathways may open in the future, we need permanent remedies to contamination. To truly remediate the problem, environmental agencies must act to reduce indoor air intrusion by reducing the source of vapors. Efforts should be made to remove or treat contaminants below residences so that future intrusion will not occur. We recognize that remediation cost is often a factor in reducing the source of vapor intrusion, but it should not always be the only criterion that drives remediation. Remediation costs to business and industries responsible for contamination should be secondary to protecting public health.

## Long-Term Maintenance and Monitoring

Moore explained the need for long-term assurances: “once vapor intrusion issues have been identified and equipment for mitigation and monitoring is in place, long-term monitoring will be necessary to help ensure that the vapor intrusion equipment is working and being maintained properly.”

Hall was more specific about long-term monitoring: “After mitigation systems are proven to work, testing should then take place every 3 to 4 years to make sure levels in the home continue to be protective.” Oldfield differed slightly, “Yearly tests on *both* mitigated and unmitigated buildings within and near the edge of known contamination plumes should be conducted to ensure public health.

Moore further discussed long-term requirements:

If engineering controls or institutional controls are in place, they need to be monitored with a well-thought-out contingency plan in place in case of failure. Failures do happen. The lack of appropriate contingency and communication plans or a break-down in their execution is not acceptable.... The assumption must not be made that once controls are in place the problem has been adequately addressed. Failures do happen and must be planned for from the start.

She called for alarms to warn of system failure: “Sensors and alarms should be part of the mitigation system design. Residents need to know immediately if a mitigation

system fails and is no longer working properly.” Hall agreed: “As for a building which is definitely impacted and where a system is installed, some sort of alarm system should be installed should the active mitigation system (blowers, etc.) shut off or burn out.”

Horton expressed dissatisfaction with the maintenance of her mitigation system:

I think that there is a long way to go as far as polluters accepting responsibility; I believe it is only done when the pressure is on them and there is public outcry. In an ideal world a person's whose home is under remediation would have scheduled maintenance with checking of the equipment and air testing. What I have experienced is that I get a phone call to schedule maintenance; I return the call, leave voice mails, leave messages, and months go by where I have to continue proactively contacting the go-between company—the company that mediates between me and the polluters—to try and get maintenance and testing done. I think I am at about four months into this latest “telephone-tag” process.... The person whose home has been contaminated should not have to pay, should not have to nag, and should not have to be the one making sure that the polluters and the management companies do what is right.

### **Land Use and New Construction**

Panelists were worried that new land uses and construction at contamination sites would put sensitive populations, such as children, at risk. Dorr questioned of the safety of the new high school at Gorham Silver. Hall wondered how gymnastic students in a building near the source of VOC contamination in Hopewell Junction would be protected from potential changes in indoor air. Oldfield concluded:

Since we know little about the effects of VOC's on our most sensitive population, our children, we need to be the most protective of children's health as possible. If a school is sited on a contaminated site, Herculean efforts should be made to reduce exposure for these children.

Hall is concerned about new *residential* construction in her neighborhood:

There are proposals for more homes to be built in the Superfund area. There is no legislation for this type of circumstance: nothing to force new homes on vapor sites to be built *with* mitigation devices already installed. There is no law that says potential homeowners must be made aware of this “potential” environmental problem. You do not know unless you test. There is nothing forcing sellers to do the test. Therefore sellers do not have to disclose this information. I would like to see mitigation systems required for new construction at or close to vapor sites.

Moore's position was similar, but more general:

Redevelopment should not be allowed to go forward in a contaminated area, especially a Superfund site, before vapor intrusion investigations are completed. Building codes and zoning processes need to address vapor intrusion when proposals are made for new construction, uses or redevelopment. Cities need to



become a partner in the vapor intrusion mitigation process and support responsible development/redevelopment at these sites.

If vapor intrusion is suspected or known, then permits that are conditional upon installation of pre-emptive mitigation techniques should be the minimal guideline for new construction at contaminated sites. Questions about vapor intrusion should come up as part of development on properties with residual VOC contamination. Addressing this issue prior to final building design and construction may provide more options to address vapor intrusion. With knowledge of the extent of contamination, additional remediation work can be done to accommodate building construction, or building design can be modified to address the residual contamination left in place. If residential or commercial development is to be allowed, it is important prospective developers know that extensive investigation and remediation may be necessary. Public health must be adequately protected.

Oldfield stated a similar, perhaps stronger position:

If vapor intrusion is suspected or known, contamination should be removed or reduced to the lowest extent possible *before* construction of new buildings. If contamination cannot be reduced to acceptable levels to ensure future indoor air intrusion, new construction should not be permitted. We should never think that vapor barriers or radon mitigation type systems are acceptable long-term solutions for permitting new construction on contaminated sites. In the Northeast U.S., ground and building heaving from freezing continually opens pathways for vapor intrusion. Allowing new construction on areas of known contamination by using radon-type mitigation systems is insensible. Vapor barriers and radon mitigation type systems are *not* permanent solutions to vapor intrusion issues.

Horton discussed the need to regulate new construction as well:

I think that there is so much known now about vapor intrusion that cities can have responsible building codes to require vapor intrusion pads in new construction where homes will be built over contaminated groundwater. Much of what happens in Mountain View now is due to partnerships that have developed among the EPA, the citizens' advisory group, and Mountain View City Council members and city staff. For example, if I see new construction, I follow-up with a call to Kevin Woodhouse in the City Manager's office and ask him if he is aware of the construction and if vapor intrusion pads are needed, etc. A partnership process had developed which allows much safer building of new construction.

In fact, Horton suggested that properly protected and monitored construction at a potential vapor intrusion site may be better than some of the alternatives. She explained:

There are homes and buildings made from materials that outgas and pollute the indoor air so that the quality is worse than outdoor air. People use dry cleaners, solvents, chemicals and have carpets and material that pollute them with a plethora of chemicals every day. So would I want my day care center in a brand-new portable classroom, a classroom that will outgas tremendous amounts for at

least seven years, or would I want my day care over a contaminated site remediated and built in a style to ensure acceptable air quality?

### **Future Forums**

Panelist Bruce Oldfield noted that members of the public often find themselves at the end of a tight agenda dominated by experts and officials. In San Diego, he joined audience participants in pointing out there was inadequate time, at the end of a long day, to engage in full-fledged discussion of the issues that the stakeholders raised. Indeed, audience members, though attentive, did not ask questions. Thus, while the San Diego forum laid the groundwork for a larger forum on the East Coast in the Fall of 2008, it also demonstrated the need to create an agenda that doesn't delay stakeholder representatives to the end and instead provides adequate time, early enough, to stimulate full discussion and debate.

After the panel, stakeholders and other met informally to compare notes and discuss the issues raised during their formal presentations. It was clear that the people who live and work at vapor intrusion sites have lessons for each other. Any future forum should be structured to encourage such sharing of experience.

### **Lessons Learned**

The stakeholder panelists in San Diego demonstrated forcefully that the people directly impacted by vapor intrusion are capable of understanding the technical and policy issues. As Debra Hall's table illustrated, they pay close attention to the data describing the air in their homes. They also have informed, useful views about how to improve the policies and procedures that govern vapor intrusion responses.

The forum also showed that U.S. EPA's focus on the attenuation factor, discussed earlier in the evening, was of relative minor interest to the affected public. It's not that they reject the value of improved data bases and mathematical models. Rather, they seek real data on indoor air concentration, and they have repeatedly opened their homes and cleaned out their closets to ensure accurate sampling.

**Communicating with the Public.** Stakeholder panelists agree that outreach to people whose homes are directly impacted is different than involving the public at large. Furthermore, they want the officials or consultants assigned to take public inquiries to be adequately prepared.

**Sampling.** Panelists, some of whom have repeatedly allowed sampling crews into their homes, find that indoor air sampling—including real-time sampling—to be the best measure of vapor intrusion. Noting the temporal and spatial variations in both soil gas and indoor air sampling, they advocate recurring sampling.

**Mitigation.** Again noting variations in sampling results, the stakeholders like the blanket approach to mitigation, and based upon their own experiences they argued for confirmatory sampling to ensure that mitigation is working.

**Source Control.** The panelist strongly argue that mitigation is not a long-term solution to vapor intrusion. They advocate full cleanup of contamination in the soil and groundwater.

**Long-Term Maintenance and Monitoring.** Stakeholders want recurring monitoring to ensure systems are working, and they look forward to alarm systems that can warn of breakthrough. Some want better support from those responsible for maintaining active mitigation systems.

**Land Use and New Construction.** Participants want investigations and, in some cases, cleanup completed before new buildings are built at sites with potential vapor intrusion. Mitigation should be required, but it is not enough.

**Future Forums:** At future vapor intrusion forums, stakeholder presentations should be placed near the start of the program, and there should be ample time set aside for public participants to informally share their experiences and concerns.

Some of the stakeholder observations in San Diego reinforce current state and federal policy, while others suggest a need for change. The stakeholders don't expect an instant adoption of their recommendations. But they deserve to play a role in all future discussions of vapor intrusion policy.