



Community Involvement for Superfund Sites Affected by Vapor Intrusion

Description

Vapor intrusion is the general term given to the migration of contaminant vapors from any subsurface contaminant source, such as contaminated soil or groundwater, through subsurface soils and into the indoor air spaces of overlying buildings. Vapor intrusion can occur in a broad range of land use settings, including residential, commercial, and industrial, and affect buildings with virtually any foundation type (e.g., basement, crawl space(s), or slab on grade). Vapor intrusion is similar to radon intrusion in that mechanisms of subsurface vapor migration and soil gas entry into buildings are similar for radon and volatile, hazardous contaminants of concern (COCs). Vapor intrusion is widely recognized as a potentially significant cause of human exposure to “volatile” (i.e., vapor-forming) hazardous chemicals in indoor spaces. When vapor intrusion is significant, concentrations of toxic vapors can accumulate indoors to a point where the health of the occupants (e.g., residents, workers, etc.) in those buildings could be at risk. Methane and certain other volatile chemicals can pose explosion hazards when they accumulate in confined spaces, in addition to the toxicity threats they may pose in occupied spaces.

Community involvement is a key component of any site investigation or other EPA response action. Members of the public affected by vapor intrusion should be aware of what EPA is doing in their community and have a say in the decision-making process. Stakeholder and community involvement is particularly important for sites with vapor intrusion issues, in part because exposure to toxic vapors may pose an unknown risk to inhabitants (in the absence of mitigation systems), as they potentially

arise in homes, workplaces, schools, and places of commerce and gathering. Community involvement at sites with vapor intrusion also is particularly important because indoor air sampling often is required, sometimes in private residences. In some cases, EPA has newly identified vapor intrusion as an exposure pathway when conducting other site activities, or during periodic reviews such as the *Five-Year Reviews*¹ required by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), which poses a unique community involvement challenge.

Required Activity

Yes. CERCLA and the National Contingency Plan (NCP) contain specific requirements for community involvement, such as preparing a *Community Involvement Plan* (CIP) and setting up an *Information Repository*, at all Superfund remedial and removal sites, including sites with vapor intrusion. There are no additional community involvement requirements specific to sites with vapor intrusion. However, because of the nature of the vapor intrusion pathway and the intrusive nature of assessment and mitigation, there are some special considerations EPA site teams should keep in mind when conducting community involvement at these sites.

When

Because of the intrusive nature of vapor intrusion assessment and mitigation, stakeholder involvement is important throughout the process. Community involvement activities should be initiated as soon as possible after determining vapor intrusion may exist at a site. Informing the community about vapor intrusion concerns and plans to conduct an assess-

¹ EPA’s Superfund program five-year review webpage contains links to important guidance documents, fact sheets and other materials: <http://www.epa.gov/superfund/cleanup/postconstruction/5yr.htm>





ment, including sampling, can be resource intensive. Therefore, EPA, in coordination with appropriate state and tribal officials, should evaluate each project to assess the level of interest and need for community involvement during various stages of the decision-making process.

In some instances, EPA has newly identified vapor intrusion as an exposure pathway when conducting other site activities, or during periodic reviews such as the Five-Year Reviews required by CERCLA. This situation presents a unique challenge to site teams, and is discussed in detail on page 8.

Making It Work

The Community Involvement Coordinator (CIC) for a site with vapor intrusion should work with other members of the site team to plan and implement a community involvement approach that addresses the unique characteristics of each site and the specific needs of the affected community.

See the [Community Involvement Handbook](#) for a full discussion of how to plan and conduct community involvement at remedial and removal sites. This tool focuses on some of the special considerations when planning and conducting community involvement at sites with vapor intrusion. For additional information about some of the techniques discussed, please follow the hyperlinks to the appropriate tool in the [Community Involvement Toolkit](#).

Developing a CIP or Updating an Existing CIP at Sites with Vapor Intrusion

The CIP is a site-specific strategy to enable meaningful community involvement throughout the Superfund cleanup process.² CIPs specify EPA-planned community involvement activities to address community needs, concerns, and expectations that are identified through [Community Interviews](#) and other means. An important component of a CIP is a [Community Profile](#), which is a description of the affected community that summarizes demographic information and identifies significant

subgroups in the population, languages spoken, and other important characteristics of the affected community, such as whether the site is located in an area with environmental justice concerns or includes sensitive populations.

While conducting community interviews and preparing a community profile for the CIP are important activities at all Superfund sites, learning about community needs and their preferred means for communicating with EPA may be especially critical at sites with vapor intrusion, because the vapor intrusion assessment and mitigation process often can involve sampling and/or mitigation in buildings, including private residences. The CIP for a site with vapor intrusion should contain specific activities and outreach efforts to educate community members about the vapor intrusion pathway, sampling and mitigation methods, as applicable. The CIP should be a “living” document and is most effective when it is updated or revised as site conditions change.

Developing Communication Strategies and Conducting Outreach

A well-thought-out CIP will describe several community involvement activities and the rationale for them. Among the activities that could be undertaken at sites with vapor intrusion are:

Communication Strategies: Vapor intrusion is a new concept for most people, and the success of effective community involvement hinges on the public understanding the concept and what the assessment and mitigation process is likely to involve. Developing and/or disseminating outreach materials, diagrams/pictures, and providing training opportunities are just a few examples of methods that can be used to help the public understand vapor intrusion. It is important to identify and accommodate hearing-impaired and limited English proficiency (LEP)³ persons in all outreach efforts by providing spoken or sign language interpreters at meetings and translating printed outreach materials, as appropriate.

² The [Community Involvement Plans](#) tool is a valuable resource to help in developing the CIP.

³ Executive Order 13166, “Improving Access to Services for Persons with Limited English Proficiency” requires Federal agencies to examine the services they provide, identify any need for services to those with limited English proficiency, and develop and implement a system to provide those services so LEP persons can have meaningful access to them.



It often is a good idea to develop a strategy or strategies for communicating information about vapor intrusion in preparation for community outreach at sites with vapor intrusion. [Communication Strategies](#) are site- or issue-specific plans for communicating information related to a specific issue, event, situation, or audience. They serve as the blueprints for communicating with the public, stakeholders, or even colleagues. Communication strategies should outline the objective/goals of the communication; identify stakeholders; define key messages; pinpoint potential communication methods and vehicles for communicating information and obtaining information from the community for a specific purpose; and specify the mechanisms that will be used to obtain feedback on the strategy.

It may be necessary to develop one or more communication strategies for sites with vapor intrusion. For example, the site team may need to develop one communication strategy targeted to all stakeholders, with the objective of educating the community about the vapor intrusion pathway and mitigation options; and perhaps a second communication strategy targeted to residents of homes for which sampling is recommended, with the objective of explaining the sampling process and potential mitigation measures, and learning about and addressing residents' concerns about the sampling and mitigation process.

Conducting Community Outreach: CICs will likely utilize several different outreach techniques during the course of the cleanup process. When planning community outreach, it generally is recommended that the CIC collaborate with internal and external partners, such as local, state and tribal officials/departments of health; faith-based organizations; and community groups.

Site teams at sites with vapor intrusion also may wish to consider a variety of community outreach techniques, including, but not limited to:

Community Meetings. [Public and Community Meetings](#) and [Presentations](#) provide useful opportunities to explain environmental conditions at the site, potential health impacts, intended indoor air sampling and remediation strategies. It may be helpful to hold meetings prior to and following key sampling events to describe sampling strategies and consequent results, respectively. The meeting should include a period to address specific questions from the public

regarding sampling, sampling results or any other specific concerns; visual aids and [Maps](#); and, if necessary, spoken or sign language interpreters to facilitate the communication and discussion.

[Attachment 1](#) is a sample figure that can be used to help explain vapor intrusion and may be useful in a presentation or handout. Conceptual Site Models (CSM) also may be useful in explaining vapor intrusion issues. A CSM uses data gathered at the site to explain how and where contaminants are expected to move and what impacts such movement may have. A CSM often uses many different techniques to organize and communicate information about a site, including written summaries, pictorial representations, maps or flow charts.

It may be helpful to follow up with meeting participants to inquire about the effectiveness of the meeting and whether it met their needs. Other meeting follow-up activities could include responding to requests for information, distributing meeting notes, adding/creating a [Mailing List](#) and sending thank-you notes to participants.

Additional opportunities to educate community members about vapor intrusion include [Public Availability/Poster Sessions](#) and public forums at community group meetings or neighborhood board meetings. These options are more informal ways of interacting with community members and allow a casual “question and answer” or discussion format, compared to the more formal presentation at a public or community meeting.

Media. The [Media](#) can be the best means of reaching a large audience quickly. Extending invitations to the media for important meetings,



On-Scene Coordinator Steve Renninger describes vapor intrusion at a community meeting for the Behr Dayton Thermal Systems VOC Plume site in Dayton, Ohio.



providing opportunities for media questions to be addressed in a timely manner, and recognizing that the media will control the content of their publication are all important considerations when working with the media. The CIC can work with the Agency's regional site press officer to foster a relationship with the media by sharing the Agency's rationale for its plans and actions. This groundwork can help lead to media reports that clearly and transparently convey information and are based on accurate and complete information. It is appropriate to use the media to publicize a site-related decision, an upcoming meeting, changes in schedule, or changes in activities or expectations. Press releases can be used to inform the media of major site-related milestones.

Fact Sheets. Communities appreciate concise, easy-to-understand, and technically accurate *Fact Sheets* on the history of the contamination, COCs, potential risks, planned cleanup activities, and the vapor intrusion assessment and response actions. Because sites involving vapor intrusion can be complex, it may be useful to include additional information in fact sheets for homeowners and renters, including household products that may be potential sources of indoor air contamination, as well as steps that can be taken to minimize these sources. Be sure to include details on whom to contact for more information.

EPA recommends preparing and distributing periodic status updates and fact sheets to community members throughout the cleanup process. (See Attachment 2, EPA's *What You Should Know about Vapor Intrusion* fact sheet for a general overview of vapor intrusion and answers to some common questions. Another useful fact sheet on vapor intrusion is Attachment 3: *A Citizen's Guide to Vapor Intrusion Mitigation*, which provides an explanation of vapor intrusion and mitigation methods in layman's terms. Also see Attachment 4, *Redfield Site: Testing/Ventilation Procedures*, for an example of a site-specific fact sheet that describes testing and mitigation procedures.)

Electronic Notification. It also may be useful to establish a registration capability that allows

interested community members to sign up for an email listserv or automatic alerts to updates posted on the site's website.

Additional Activities When Indoor Air Sampling is Planned

Additional community involvement activities are necessary when there are plans to conduct indoor air sampling. In addition to the general community involvement activities occurring throughout the cleanup process, the site team may choose to hold a community meeting to discuss indoor sampling efforts and results.⁴

It usually is necessary to contact each building owner or renter to obtain an access agreement so that the sampling may be undertaken. It also is important to report sampling results to each owner or renter. In these cases, the site team should follow up by sending a letter to each home or building owner and renter explaining plans to conduct sampling, or provide results and schedule one-on-one meetings with the building or home owner to discuss access agreements, sampling efforts, and sampling results. When there are plans to sample on, in, or under nonresidential buildings, such as schools, libraries, hospitals, hotels, and stores, broader outreach to the public may be appropriate, while maintaining direct contact with the property owner.

When indoor air sampling is required, the following activities are recommended:

Letters. Whenever there are plans to conduct indoor air sampling, it is recommended to send a letter to each building owner and renter explaining plans to conduct indoor air sampling and requesting written permission for voluntary access to do so. This letter generally should be in addition to a one-on-one meeting with the building owner or renter to discuss sampling efforts and explain access agreements in detail. It also is recommended that letters be sent to each building owner and renter to report sampling results in a timely manner. These letters and meetings often are part of a larger effort that also includes use of other communication strategies, such as community meetings and in-person visits.

⁴ EPA developed answers to a collection of Frequently Asked Questions (FAQs) about vapor intrusion at Superfund sites. These FAQs provide information and recommendations based on experiences garnered over the last few years in addressing vapor intrusion at Superfund remedial and removal sites and cleanups undertaken using other statutory authorities. www.epa.gov/superfund/sites/npl/Vapor_Intrusion_FAQs_Feb2012.pdf



In-Person Visits. Whenever possible, EPA recommends individual, one-on-one communication with each property owner and renter of homes or businesses that will be subject to indoor air sampling. Here are some tips for doing so:

1. Try to schedule in-person visits with individual property owners and renters. These visits also may include owners and renters of properties located outside the planned investigation area, as applicable. The initial visit can be used to explain sampling plans in more detail, answer questions, and obtain written permission to sample.
2. During the visit, the property owner/renter should be briefed on any instructions to follow during sampling activities (for example, keep doors and windows closed during sampling), and a general survey of the building should be conducted to determine likely sources of indoor air contaminants.
3. The site planning team should instruct the owners and renters about the sampling devices that will be used, what they look like, where they will be located, and the ways in which the ongoing sampling might restrict daily activities.
4. The site sampling team should arrive on time for sampling. Someone knowledgeable and able to explain the sampling procedure should accompany the sampling staff. As appropriate, include an interpreter.

Obtaining Building Access for Sampling and Mitigation

Gaining access to owner-occupied residences for vapor intrusion sampling and mitigation may be handled differently than for commercial buildings or rental properties. It is recommended that all requests for access, as well as provision of access, be in writing in order to document EPA's due diligence to protect human health at the site.⁵ It is also recommended that the site planning team instruct owners or renters about the sampling devices being used, including what they look like, where they will be located, and the ways in which the ongoing sam-

pling might restrict daily activities. Holding public availability sessions before, during and after sampling, as well as sharing pictures depicting the sampling process for the residents or owners anticipating signing the access agreement, may help to answer questions and facilitate the signing process.

In general, more than one attempt should be made to obtain an access agreement. The number of attempts to obtain access to perform a vapor intrusion assessment or install a mitigation system should be consistent with Regional practice. All attempts should be documented using telephone conversation records, e-mails, or letters sent to home or building owners.

Owner-Occupied Residences: Allowing EPA to sample or install mitigation systems in an owner-occupied residence is a voluntary action. Owners occupying their homes should be encouraged to take advantage of an offer for an assessment and mitigation system, if necessary.

Rental Properties: Access may be voluntary or involuntary. Site planning teams often deal with both owners and renters when there is a need to sample on, in, or under a rental property. There are different legal and communication issues for owners and renters. For example, the owner is responsible for granting access for sampling and installation of mitigation measures, if they are necessary; however, if the owner granted access, logistics normally are arranged with the renter. Both the owner and the renter should be apprised of vapor intrusion exposure concerns that have the potential to adversely affect human health, which includes providing sampling results to both parties. If the owner of a rental property refuses access, EPA may require access, in the interest of protecting the occupants, for determining the need for response, choosing a response action, taking a response action, or otherwise enforcing CERCLA.⁶ Notifying the owner of a rental property of this authority may help to avoid the need for legal action.

⁵ EPA statutory authority to access private property to conduct investigations, studies and cleanups pursuant to CERCLA and RCRA, as amended, is discussed in Section 1.2 of the *OSWER Final Guidance for Assessing and Mitigating the Vapor Intrusion Pathway from Subsurface Sources to Indoor Air* as entered on [Regulations.gov](https://www.regulations.gov) under docket EPA-HQ-RCRA-2002-0033.

⁶ EPA's *Memorandum on Entry and Continued Access under CERCLA* (1987) www2.epa.gov/sites/production/files/documents/cont-access-mem.pdf and *Memorandum on Clarification of CERCLA Entry Policy* (2010) www2.epa.gov/sites/production/files/documents/access-clarify-10.pdf



Nonresidential Buildings: EPA may need to sample on, in, or under nonresidential buildings, such as schools, libraries, hospitals, hotels, and stores. In these situations, broader outreach to the public may be appropriate, while maintaining direct contact with the property owner. Similar to rental properties, access for sampling and installation of mitigation measures, if they are necessary, may be voluntary or involuntary. If the owner of a nonresidential building refuses access, EPA may require access, in the interest of protecting the occupants, for determining the need for response, choosing a response action, taking a response action, or otherwise enforcing CERCLA.

Property Ownership Changes: For owners of homes or buildings who did not provide access for assessment sampling or installation of a mitigation system, it is recommended that the site team make reasonable attempts to track ownership changes, although the appropriate state or local agency or potentially responsible party (PRP) may be in a better position to track this information. For example, reasonable attempts to make contact can be done by conducting drive-bys, checking online real estate sales or title insurance listings periodically, or using other mechanisms. Homes that were initially targeted but not sampled can be reconsidered during the review or if there are major changes to the toxicity values for the site COCs. Annual notification to owners of homes or buildings not previously sampled is a method that could provide the opportunity to reconsider testing with a change in ownership. If ownership changes are noted, then appropriate follow up can be conducted with the new home or building owner.

Communicating Sampling Results and Information about Mitigation Options

Prompt communication of sampling results to building or home owners is important, as some people may choose to make precautionary decisions prior to regulatory decisions on remediation or mitigation measures. The site team should recognize resident and property owner preferences for confidentiality with regard to property-specific data. It may be appropriate to display sampling results differently for private residential properties compared to community properties (such as schools, daycare centers, commercial buildings) with regard to data portrayed on maps provided in reports,

displayed at public meetings, and otherwise made available to the community.

Transmitting Sampling Results: It is recommended that the site planning team provide validated sampling results in plain English (and translations, if necessary) to property owners/renters within about 30 days of receiving the results. The data transmittal letter also should indicate what future actions, if any, are necessary based on the sampling results. Letters reporting sampling results will almost certainly contain site-specific and possibly building-specific information about various issues, such as COCs, screening levels and mitigation options. However, additional information for inclusion in these letters may include, but is not necessarily limited to:

- **Site and Home/Building Information:**
 - Site name and location of contamination
 - Date of sampling
 - Address of sampled home or building
 - Locations sampled (both indoor and outdoor)
- **Sampling Results:**
 - Sampling results for site COCs
 - Sampling results for other chemicals, if detected, including an explanation of results believed to be attributable to background sources, if known
 - Risk-based screening levels used (for example, vapor intrusion screening levels)
 - Explanation of sampling results, if known
 - Paragraph listing results, comparison to screening level and explanation
 - Table of results, including sampling results and screening values followed by an explanation of results, if known
 - Simple tabulated and color-coded results (representing exceedances of human health risk levels or no exceedance)
- **Diagrams/Illustrations:**
 - Letters requesting access for sampling may include diagrams and illustrations of sampling devices.
 - Letters giving sample results or suggesting a mitigation system may include diagrams and illustrations of sampling locations or specific mitigation system diagrams (for example, how a sub-slab depressurization system works and looks).



- **Next Steps:** An explanation of what the building owner or resident should expect as a result of the sampling and when he or she can expect to be contacted again. This section may include:
 - An explanation of mitigation process and responsibilities (if applicable) (mitigation options; timeline for further contact regarding system installation and options). If a building mitigation system is recommended on the basis of a risk assessment, it is recommended that the site planning team explain that the risk calculation reflects many conservative, health-protective factors.

It is recommended that the letter describe actions for property owners and occupants to reduce vapor intrusion exposure until mitigation systems are in place (See [Attachment 2](#), for example).

- **Contact Information:** Contact information for a person who can answer questions or supply further explanations should be provided in communications with building and homeowners. The location of the site information repository or site website also can be included as a resource for public access to more detailed site documents.

Transmitting Information About Mitigation Systems:

The initial notification to residents or building owners about mitigating vapor intrusion can be delivered in various ways. A primary mechanism is a face-to-face meeting with the building owner or occupant to explain the sampling results and discuss next steps, including installation of a vapor intrusion mitigation system. It is recommended that this meeting include a member of the site team (Remedial Project Manager, On-Scene Coordinator, or risk assessor, for example), a representative from the local health department or the Agency for Toxic Substances and Disease Registry, and the mitigation contractor scheduler. This meeting could discuss topics such as:

- **Sampling Results:** Describe where samples were taken and the COCs found, and explain the results as related to site action levels. Any questions related to health impacts or risks can be answered by the risk assessor or health representative at this time as well. For questions or concerns regarding personal health, residents

and building owners should be directed to contact their medical professional.

- **Mitigation System Details:** Describe the need for a mitigation contractor to visit the residence to identify potential locations for the mitigation system. The property owner will need to be present for the visit and will have input on where the system is installed. Photos of a mitigation system (piping, system fan, number of holes drilled in the slab, height of the vent on the outside of the residence, etc.) may be helpful. The site planning team representative also should mention the need for an additional access agreement approving the installation of the mitigation system described in the meeting.
- **Cost of the Mitigation System:** Explain which party will pay for the installation of the mitigation system (EPA or a PRP, for example) and anticipated property owner costs. EPA or a PRP may pay for the system installation, and the property owner or PRP may be required to pay for the monthly costs (such as utility costs) associated with running the mitigation system.
- **Project Schedule and Next Steps:** The meeting may be concluded by giving an overview of the project timeline, including the appointment for the mitigation contractor visit and system installation. The property owner or occupant should be told the project sample team will need to return after the mitigation system is installed to conduct post-mitigation sampling to confirm the system is lowering contaminant levels in the air to below site-specific action levels. A follow-up sampling date will be determined and sample results will be communicated to the property owner.
- **Other Sources of Indoor Air Pollution:** It is recommended that the property owner or renter be informed that the system normally is designed to protect the home or building only against vapor-forming chemicals coming from the subsurface. A vapor intrusion mitigation system generally will not protect the home against continuing indoor sources because vapor intrusion mitigation systems typically are not indoor air filtration systems. For this reason, property owners and occupants should be educated



about sources of indoor air contamination in order to minimize exposure. Further, mitigation systems installed for vapor intrusion also will reduce or prevent naturally occurring radon from entering the building, providing an added benefit to human health.

- **If the Offer to Install a Mitigation System is Declined:** It is recommended current owners or occupants be advised that if they decline an offer to install a vapor mitigation system, they may be responsible for the costs of installing and maintaining their own system if they decide to do so at a later time. The owner or occupant should sign a waiver to document they have declined the mitigation system.

Notification also can be provided through the data transmittal letter. In many cases, however, the decision to install mitigation systems will not have been made prior to the transmittal of sampling results. In these situations, data transmittal letters can be sent conveying the message that EPA is reviewing all data results for the affected area and is considering appropriate next steps. Once the decision document is signed, the site planning team can develop and mail a fact sheet to all community members in the affected area, followed by a community meeting.

(See Attachment 5, [*Indoor Air Sampling and Evaluation Guide Instructions for Residents of Homes to Be Sampled*](#), for an example list of instructions that can be distributed to owners/renters in preparation for indoor air sampling and Attachment 6, [*U.S. EPA Begins Testing for Vapor Intrusion*](#), which provides an example of an EPA site-specific fact sheet that describes the contamination at the site and preliminary sampling results.)

Addressing Community Involvement at Sites with a Newly Identified Vapor Intrusion Exposure Pathway

Ongoing site activities with assessment components, such as remedial investigations and monitoring, allow EPA to continually evaluate site conditions and adjust cleanup actions as warranted. In some instances, EPA has newly identified vapor intrusion as an exposure pathway when conducting other site activities, or during periodic reviews such

as a Five-Year Review. This situation presents a unique challenge to site planning teams.

Conducting community involvement at sites with newly identified vapor intrusion exposure pathways may be complicated by several factors including:

- A remedy for the control of exposure to volatile organic compounds already has been installed, proposed, or is under construction as part of the cleanup plan.
- Ownership of properties previously exposed to VOCs has changed hands through resale, foreclosure, or assumption of the property by second-generation homeowners. These owners were not part of any original resolution to exposure issues and in many cases may not even be aware that a remediation or treatment was put in place.
- Property owners and other community members who participated in prior cleanup efforts may be reluctant to fully engage with efforts to reopen lines of investigation at their properties.

In these and similar circumstances, the challenge for Agency representatives is to resume contact with communities that have put past difficulties behind them. In many cases, mailing lists are outdated, previous reliable contacts are no longer available, and elected officials may not have institutional memory of the events that prompted the remediation.

Every re-entry into a community is different and should be approached as a site-specific situation. Therefore, it is recommended that events and activities be planned to acknowledge and accommodate the inevitable changes in the makeup of a community. In addition to the communication strategies and community involvement techniques described previously, other suggestions to ease re-entry and revitalize community involvement at a site with a newly identified vapor intrusion exposure pathway include:

- Reassess the community and the site by revisiting the site and the surrounding areas and take note of new construction.



- Reintroduce yourself and the Agency to current municipal staff and check previously used public venues for viability. Determine if new venues may be closer or more accessible to the community.
- If contacts within the community are still extant, reconnect; ask for updates on the growth and stability of the community. If no viable contacts exist, attempt to cultivate new ones.
- Revise and update mailing lists and fact sheets.
- As with all sites affected by vapor intrusion issues, be prepared to go door to door to meet with property owners and to hold public meetings/forums to explain what the current investigation is about and how this is an important step in ensuring public safety.
- Consider updating/revising the site CIP to reflect current community needs and concerns.

Property Value Concerns for Current and Prospective Property Owners

EPA recognizes vapor intrusion issues may impact property values. However, property value issues are a subject that is outside the scope of Agency authority. In general, if asked, EPA recommends that Regional staff suggest prospective buyers and sellers contact real estate professionals and lenders from the local area with questions about property values. If a home owner or renter has questions about vapor intrusion mitigation systems, EPA Regions can provide information that explains how vapor intrusion mitigation systems are designed to reduce exposure to chemicals found in indoor air and to avert human health-related problems. In some instances, mitigation systems and other cleanup measures may help to restore property values.

Tips

- Develop communication strategies and prepare a CIP as soon as possible when initiating community involvement efforts. Update or revise the CIP as needed.
- Initiate community involvement activities as soon as possible after determining that vapor intrusion may exist at a site.
- Commit to ongoing, sustained communication activities throughout vapor mitigation and site cleanup efforts.
- When considering the most effective community involvement strategies, consider EPA's previous involvement at the site, the existence of community or neighborhood groups, and the phase of the regulatory process during which vapor intrusion is being addressed.
- Recognize resident and property owner preference for confidentiality regarding property-specific data. It may be appropriate to consider allowing property owners and residents to "opt in" to have their data portrayed on maps provided in reports, displayed at public meetings and otherwise be made available to the community.

Additional Resources

EPA Office of Solid Waste and Emergency Response (OSWER) Vapor Intrusion Website:
www.epa.gov/oswer/vaporintrusion

*EPA OSWER. *Final Guidance For Assessing And Mitigating The Vapor Intrusion Pathway From Subsurface Sources To Indoor Air*. 2013.
www.regulations.gov/#!docketDetail;D=EPA-HQ-RCRA-2002-0033

Related Tools

- Communication Strategies
- Community Involvement Plans
- Community Profile
- Fact Sheets
- Five-Year Review
- Information Repository
- Maps and Aerial Photographs
- Presentations
- Going Door to Door (forthcoming)



*EPA is working to complete its work expeditiously and issue final subsurface vapor intrusion guidance documents so that they can be applied in forthcoming decisions. Comments received on the guidance documents can be viewed at Regulations.gov (EPA-HQ-RCRA-2002-0033).

EPA OSWER. *Superfund Vapor Intrusion FAQs*. EPA. 2012. www.epa.gov/superfund/sites/npl/Vapor_Intrusion_FAQs_Feb2012.pdf

EPA. *Assessment of Vapor Intrusion in Homes Near the Raymark Superfund Site Using Basement and Sub-Slab Air Samples*. March 2006. EPA/600/R-05/147. <http://dec.alaska.gov/spar/csp/guidance/raymark6report.pdf>

EPA. *Brownfields Technology Primer: Vapor Intrusion Considerations for Redevelopment*. March 2008. EPA 542-R-08-001. <http://nepis.epa.gov/Exe/ZyPURL.cgi?Dockey=P1000NXQ.TXT>

EPA. *Indoor Air Vapor Intrusion Mitigation Approaches*. October 2008. EPA 600-R-08-115. <http://nepis.epa.gov/Exe/ZyPURL.cgi?Dockey=P100AE72.txt>

EPA. *Fact Sheet: What You Should Know About Vapor Intrusion*. EPA Region 2. 2008. www.epa.gov/region02/superfund/npl/dover/vapor_intrusion_eng_030807.pdf

EPA. Contaminated Site Cleanup-Up Information Issue Area: Vapor Intrusion. www.clu-in.org/issues/default.focus/sec/Vapor_Intrusion/cat/Overview/

Interstate Technology and Regulatory Council (ITRC). *Vapor Intrusion Pathway: A Practical Guideline*. January 2007. www.itrcweb.org/Documents/VI-1.pdf

ITRC. *Vapor Intrusion Resources and Links*. 2009. www.itrcweb.org/vaporintrusion/

Attachments

The following are *examples* of pre-sampling documents that may be adapted for site specific use to facilitate interaction/involvement with building/dwelling occupants prior to indoor air sampling:

Attachment 1: Sample Vapor Intrusion Figure

Attachment 2: EPA Region 2. *What You Should Know About Vapor Intrusion* Fact Sheet.

This fact sheet gives a general overview of vapor intrusion and answers some common questions. Also *en Español*.

Attachment 3: EPA OSWER. *A Citizen's Guide to Vapor Intrusion Mitigation* (September 2012).

The Citizen's Guide series is a set of fact sheets that summarize, in layman's terms, cleanup methods used at Superfund and other sites.

Attachment 4: Colorado Department of Health and Environment. *Redfield Site Testing/Ventilation Procedures* Fact Sheet (August 2010).

This document provides an example of a site-specific fact sheet that describes testing/mitigation procedures. This type of fact sheet may be useful as a supplement to a community meeting or letter to building owners/occupants.

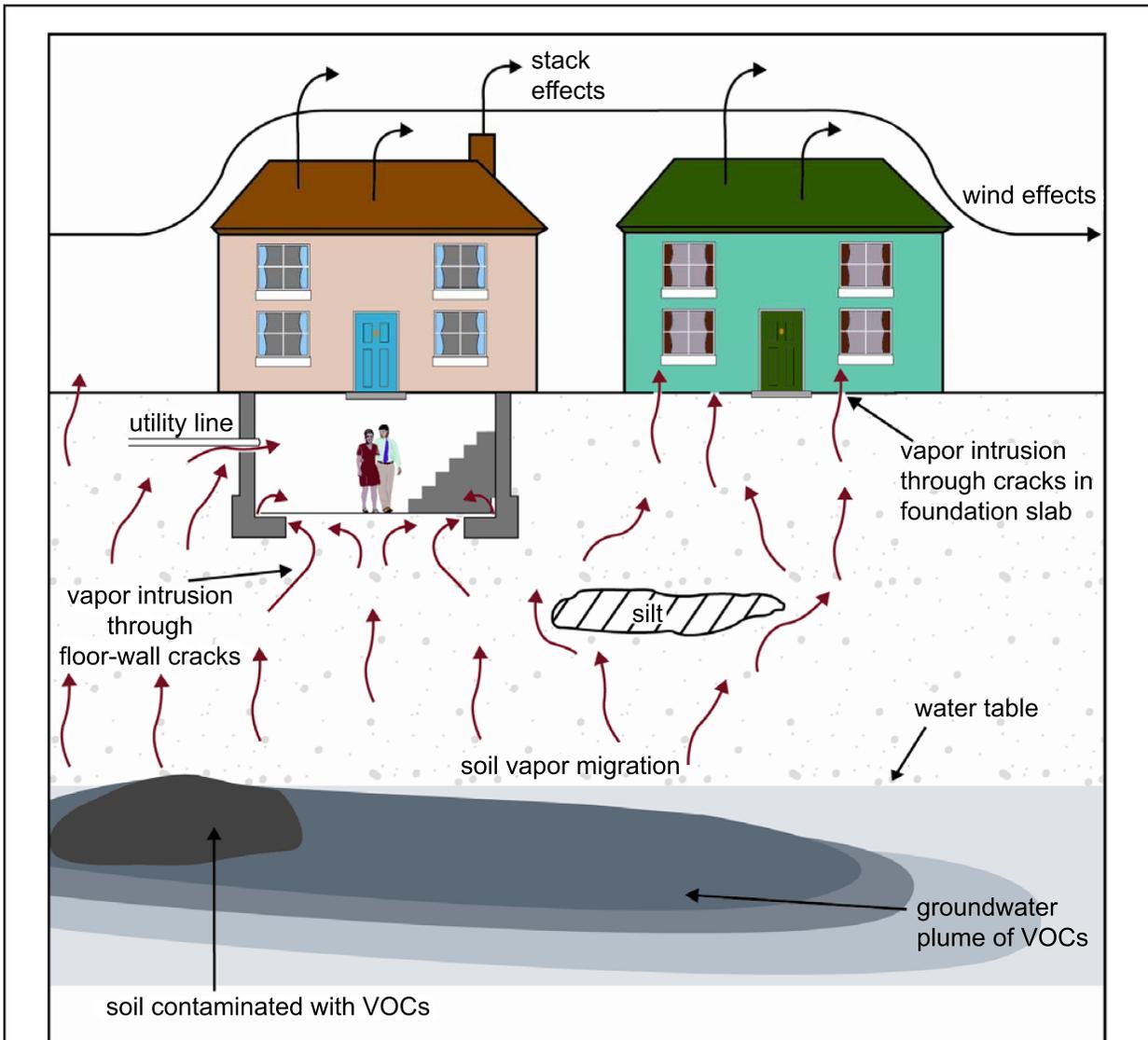
Attachment 5: Massachusetts Department of Environmental Protection. *Indoor Air Sampling and Evaluation Guide Instructions for Residents of Homes to Be Sampled* (2002).

(Also available online as Appendix 2 of the Massachusetts Department of Environmental Protection *Indoor Air Sampling and Evaluation Guide* (2002).

Attachment 6: EPA Region 8. *U.S. EPA Begins Testing for Vapor Intrusion* Site Newsletter (2005). This document provides an example of an EPA site-specific newsletter that describes the contamination at the site and provides preliminary sample results.



ATTACHMENT 1: Sample Vapor Intrusion Figure



This figure depicts the migration of volatile chemicals from contaminated soil and groundwater plumes into buildings. Volatile chemicals are shown to enter buildings through cracks in the foundation and openings for utility lines. Atmospheric conditions and building ventilation are shown to influence vapor intrusion.

(Source: The 2008 Brownfields Technology Primer: Vapor Intrusion Considerations for Redevelopment, EPA 542-R-08-001)



ATTACHMENT 2: EPA Region 2 *What You Should Know About Vapor Intrusion* Fact Sheet

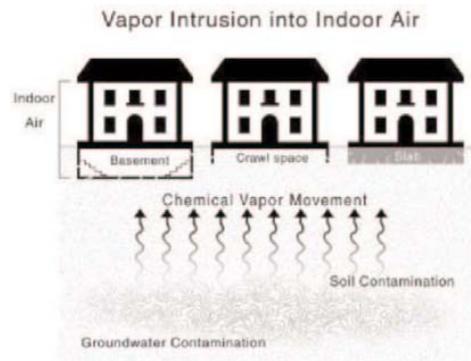


What You Should Know About Vapor Intrusion

EPA has developed this fact sheet to answer some of the most commonly asked questions about an important health issue called vapor intrusion. Vapors and gases from contaminated groundwater and soil have the potential to seep into indoor spaces and cause health problems.

What is vapor intrusion?

When chemicals or petroleum products are spilled on the ground or leak from underground storage tanks, they can give off gases, or vapors that can get inside buildings. Common products that can cause vapor intrusion are gasoline or diesel fuel, dry cleaning solvents and industrial de-greasers. The vapors move through the soil and seep through cracks in basements, foundations, sewer lines and other openings. Vapor intrusion is a concern because vapors can build up to a point where the health of residents or workers in those buildings could be at risk. Some vapors such as those associated with petroleum products have a gasoline odor, others are odor-free.



Can vapors in my home come from household sources?

Common household products can be a source of indoor air problems. Vapors and gases can come from: paints; paint strippers or thinners; moth balls; new carpeting and furniture; stored fuel; air fresheners; cleaning products; dry cleaned clothing and even cigarette smoke.

What are the health concerns related to vapor intrusion?

When vapor intrusion does occur, the health risk will vary based on the type of chemicals, the levels of the chemical found, the length of exposure and the health of exposed individuals. Some people may experience eye and respiratory irritation, headaches and/or nausea. These symptoms are temporary and should go away when the vapors are addressed. Low-level chemical exposures over many years may raise the lifetime risk of cancer or chronic disease.

How is vapor intrusion discovered?

Samples of gas in the soil or groundwater are first collected near a contaminated site. If no contamination is found near a site, then vapor intrusion should not be a problem. If contamination is found, depending on the type, the search may be widened to include samples closer to or on individual properties. The next step is to take vapor samples from the soil under the home's foundation; these are called slab, or sub-slab samples. EPA does not generally recommend indoor air sampling before slab or sub-slab sampling, because indoor air quality varies widely day to day. Also, household products may interfere with sampling results.

What happens if a problem is found?

The most common solution is to install systems often used to reduce naturally occurring radon that seeps into homes in some geographic areas. These systems, called radon mitigation systems, remove soil vapors from below basements or foundations before they enter homes. Vapors are vented outside of the homes where they become dispersed and harmless. These systems use minimal electricity and do not affect heating and cooling efficiency. They also prevent radon from entering homes – an added health benefit especially in radon prone areas. Once the source of the vapors is eliminated, the systems should no longer be needed.



Vapor Intrusion: Tightly seal common household products after use and seal them in an area that is well ventilated to avoid the release of vapors

What can I do to improve indoor air quality?

- Don't buy more chemicals than you need.
- Store unused chemicals in appropriate tightly-sealed containers.
- Don't make your home too air tight. Fresh air helps prevent chemical build-up and mold growth.
- Fix all leaks promptly, as well as other moisture problems that encourage mold.
- Check all appliances and fireplaces annually.
- Test your home for radon. Test kits are available at hardware and home improvement stores or you can call the Radon Hotline at 800-458-1158 in New York State, or 800-648-0394 in New Jersey.
- Install carbon monoxide detectors in your home. They are available at hardware and home improvement stores.



Sub-slab mitigation system: This system draws radon and other vapors out of the soil and vents them outside



ATTACHMENT 3: A Citizen's Guide to Vapor Intrusion Mitigation

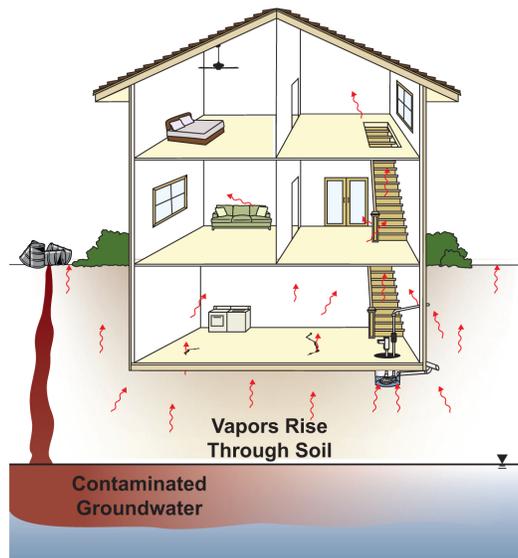
A Citizen's Guide to Vapor Intrusion Mitigation



What Is Vapor Intrusion Mitigation?

Vapor intrusion is the movement of chemical vapors from contaminated soil and groundwater into nearby buildings. Vapors primarily enter through openings in the building foundation or basement walls — such as cracks in the concrete slab, gaps around utility lines, and sumps. It also is possible for vapors to pass through concrete, which is naturally porous. Once inside the home or workplace, vapors may be inhaled posing immediate or long-term health risks for the occupants. In rare cases, the buildup of vapors, such as those from gasoline, may cause explosive conditions. Risks will depend on the types of chemical vapors and their concentrations, how much time people spend in the building, and the building's ventilation. Vapor concentrations will be higher indoors when windows and doors remain closed.

Mitigation methods, which lessen the effects of vapor intrusion, may be needed until contaminated soil or groundwater is cleaned up. Mitigation methods are available for both existing buildings and those planned for construction near the contaminated area.



Vapor intrusion into a home.

How Does It Work?

Vapor intrusion mitigation methods are classified as either “passive” or “active.” Passive methods prevent the entry of chemical vapors into the building, while active methods change the pressure difference between the sub-slab and the inside of the building to keep vapors out. Passive mitigation methods tend to be cheaper, while active methods tend to be more effective. Examples of each include:

Passive Vapor Intrusion Mitigation Methods:

- **Sealing openings** involves filling in cracks in the floor slab and gaps around pipes and utility lines found in basement walls. Concrete can be poured over unfinished dirt floors.
- Installing **vapor barriers** involves placing sheets of “geomembrane” or strong plastic beneath a building to prevent vapor entry. Vapor barriers are best installed during building construction, but can be installed in existing buildings that have crawl spaces.
- **Passive venting** involves installing a venting layer beneath a building. Wind or the build-up of vapors causes vapors to move through the venting layer toward the sides of the building where it is vented outdoors. A venting layer can be installed prior to building construction as well as within existing buildings. It is usually used with a vapor barrier.

Active Vapor Intrusion Mitigation Methods:

- **Sub-slab depressurization** involves connecting a blower (an electric fan) to a small suction pit dug into the slab in order to vent vapors outdoors. (Most common method.)
- **Building over-pressurization** involves adjusting the building's heating, ventilation, and air-conditioning system to increase the pressure indoors relative to the sub-slab area. This method is typically used for office buildings and other large structures.

How Long Will It Take?

Mitigation will be needed to prevent vapor migration into buildings as long as vapor intrusion poses a health risk to occupants. This may be several years, or even decades, until cleanup of soil and groundwater is complete.



Is It Safe?

Vapor intrusion mitigation systems are quite safe to use and will improve the quality of the indoor air by removing chemical vapors due to vapor intrusion as well as radon (another health risk) and moisture, which may lead to mold growth. However, mitigation systems will not reduce vapors from indoor sources of chemicals, such as paints, plastic items, and hobby supplies.

Until the threat of vapor intrusion is gone, mitigation systems should be inspected regularly to make sure they are working correctly. For example, floors and walls are checked to see that no new cracks develop, a geomembrane in a crawlspace is checked for rips and holes, and electric fans are checked to ensure they are working correctly. Homeowners should not turn off the electric fans until EPA or state agency notifies them that it is appropriate to do so. Homeowners should report broken fans and vent pipes to the lead agency.

How Might It Affect Me?

An occupant of a home or office constructed with a vapor mitigation system will not likely notice it. However, the installation of systems in existing homes typically takes one or two days, and workers may need to access crawl spaces or indoor living areas. They may need to pull back carpet or move furniture to find and seal cracks or to drill holes in the foundation for sub-slab pipes. They typically place these pipes near the basement walls, in closets, and in low-traffic areas for the convenience of the homeowner. The vent pipes and fan may be visible on the outside of the house. However, in some cases, the pipes may be run through a closet to the attic and vented through the roof. Later, workers may need to visit homes periodically to inspect mitigation systems to ensure the systems are working properly.

Homeowners may notice the hum of the electric fans, if they have a depressurization system. These fans use less electricity than an LED television; electric bills will rise slightly.

Why Use Vapor Intrusion Mitigation?

Vapor intrusion mitigation systems are installed to reduce health risks in buildings where chemical vapors from contaminated soil and groundwater may be inhaled by indoor occupants. They also may be installed as a precaution where vapor intrusion might occur in the future. Installing a system during building construction typically is cheaper, more effective, and less disruptive than waiting until after construction. Depressurization systems offer the added benefit of reducing radon, moisture, and mold inside the building.

Mitigation systems have been installed and operated at hundreds of homes near Superfund sites and other contaminated sites across the country.



Typical fan and vent pipe.

Example

Mitigation is reducing possible risks from vapor intrusion at 43 homes near the Nyanza Superfund site in Massachusetts. Dye manufacturing from the 1910s to 1978 contaminated groundwater with trichloroethene (TCE) and other chemicals. By the 1980s, a plume of groundwater contamination was found to extend beneath a nearby neighborhood. Sampling of indoor air, sub-slab air, and groundwater showed that vapor intrusion was occurring, and TCE concentrations posed a risk to some homeowners. Vapor intrusion also had the potential to occur at several other homes.

As a result, EPA installed depressurization systems in homes located above the most contaminated groundwater where vapor intrusion is most likely to be a problem. Before installing the systems in 2007, EPA sealed cracks in basement walls and floors, and covered sump pits. In homes with dirt basements, they poured a concrete floor or installed a vapor barrier. Following installation, each depressurization system was tested to ensure that it worked properly. The systems are inspected annually to ensure that they continue to work.

For More Information

For more information on this and other technologies in the Citizen's Guide Series, contact:

U.S. EPA
Technology Innovation &
Field Services Division
Technology Assessment Branch
(703) 603-9910

Or visit:
www.cluin.org/vi

[www.epa.gov/oswer/
vaporintrusion/](http://www.epa.gov/oswer/vaporintrusion/)

NOTE: This fact sheet is intended solely as general information to the public. It is not intended, nor can it be relied upon, to create any rights enforceable by any party in litigation with the United States, or to endorse the use of products or services provided by specific vendors. The Agency also reserves the right to change this fact sheet at any time without public notice.

United States
Environmental Protection
Agency

Office of Solid Waste and
Emergency Response
(5102G)

EPA 542-F-12-023
September 2012
www.epa.gov/superfund/sites
www.cluin.org



ATTACHMENT 4: Colorado Department of Health and Environment: *Redfield Site Testing/Ventilation Procedures* Fact Sheet (August 2010)

Redfield Site

Testing/Ventilation Procedures

March 2012

The following guidelines have been prepared to provide homeowners with a general understanding of the activities and time frames that occur during and after the indoor air of their home has been tested. These are general timeframes and may be subject to change depending on the laboratories used to analyze results, the schedules of contractors hired to install the ventilation systems, and holidays.

- The first step in the process is indoor air testing. A representative with EnviroGroup calls to schedule an appointment, then conducts an interview with the homeowner and places an air sampling canister in the lowest living area of the home. Twenty-four hours later, an EnviroGroup representative retrieves the canister.
- At week's end, canisters are sent to a Colorado Department of Public Health and Environment-approved laboratory for analysis.
- Brown Retail mails test results to homeowners within approximately 4 to 6 weeks of testing.
- If the result of the test is below the state action level, no ventilation is necessary. Periodic (e.g., semi-annual or annual) testing may be conducted. Homeowners will be contacted by an EnviroGroup representative to schedule the periodic tests.

- If the result of the test equals or is above the state action level for 1,1-DCE ($7.3 \mu\text{g}/\text{m}^3$), or $2.1 \mu\text{g}/\text{m}^3$ for groundwater-derived TCE, an EnviroGroup representative also calls the homeowner with test results. If the homeowner elects to receive a ventilation system, Brown Retail hires a ventilation contractor who calls the homeowner to set up an appointment to install the ventilation system.
- Ventilation contractors call the homeowners approximately one week after the homeowner elects to have a system. Appointments are scheduled approximately 2 to 3 weeks ahead.
- At the agreed-upon ventilation system installation date, the system is installed. Electrical hardwiring is conducted either at the same time, if possible, or approximately one week after installation.
- After the ventilation system is operating, an EnviroGroup representative contacts the homeowner to schedule a follow-up performance test. Two to three weeks after the system is installed and operating, an EnviroGroup representative comes back to the home and leaves a canister to test the indoor air with the system running. An EnviroGroup representative retrieves the canister 24 hours later and sends it to the laboratory for analysis.
- Homeowners receive results by mail approximately 4 - 6 weeks after the test. If the test result is not lower than the action level, the ventilation contractor will call to set up an appointment to inspect and modify the system. Periodic testing or inspections will continue for homes with a ventilation system.

For More Information

General questions/information:

Lisa Sigler or Chuck Montera,
Brown Retail Community Relations Representatives
303-778-8355

Colorado Department of Health and Environment:

Warren Smith, Community Involvement Manager
303-692-3373

Questions regarding your test results or ventilation system:

Jeff Kurtz, EnviroGroup 303-790-1340

Information Line: 303-637-2503

Web Site: www.redfieldsite.org



ATTACHMENT 5: Massachusetts Department of Environmental Protection. *Indoor Air Sampling and Evaluation Guide Instructions for Residents of Homes to Be Sampled (2002)*

Instructions for Residents

(to be followed starting at least 48 hours prior to and during the sampling event)

- Do not open windows, fireplace openings or vents.
- Do not keep doors open.
- Do not operate ventilation fans or air conditioning.
- Do not use air fresheners or odor eliminators.
- Do not smoke in the house.
- Do not use wood stoves, fireplace or auxiliary heating equipment (e.g., kerosene heater).
- Do not use paints or varnishes.
- Do not use cleaning products (e.g., bathroom cleaners, furniture polish, appliance cleaners, all-purpose cleaners, floor cleaners).
- Do not use cosmetics, including hair spray, nail polish, nail polish remover, perfume, etc.
- Do not partake in indoor hobbies that use solvents.
- Do not apply pesticides.
- Do not store containers of gasoline, oil or petroleum-based or other solvents within the house or attached garage (except for fuel oil tanks).
- Do not operate or store automobiles in an attached garage.

(NHDES, 1998)



ATTACHMENT 6: EPA Region 8 U.S. EPA Begins Testing for Vapor Intrusion (2005) Site Newsletter



Colorado Department of Public Health and Environment



NEED INFORMATION?

CALL US!

Colorado Department of Public Health and Environment
4300 Cherry Creek Dr. South
Denver, CO 80246

Martin O'Grady
Geologist
303-692-3366
martin.ograde@state.co.us

Cathy Schuster
Community Involvement
303-692-3308
cathy.schuster@state.co.us

U.S. Environmental Protection Agency
999 18th Street, Suite 300
Denver, CO 80202-2466
1-800-227-8917

Steven Way
Project Manager
303-312-6723
way.steven@epa.gov

Peggy Linn
Community Involvement
303-312-6622
linn.peggy@epa.gov

U.S. EPA Begins Testing for Vapor Intrusion

Near I-25 and Logan Street

Denver, Colorado

Volume 1 Issue 4

July 2005

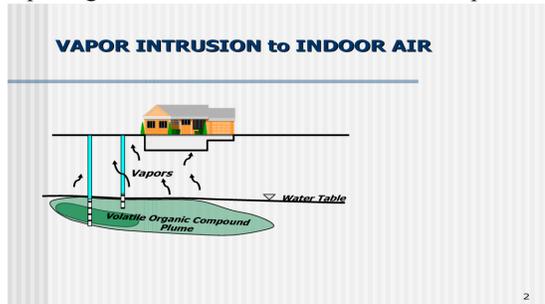
What Has Been Happening?

After a plume of trichloroethylene (TCE) was discovered at Interstate 25 and Logan Streets, the Colorado Department of Public Health and Environment (CDPHE) asked the US Environmental Protection Agency (U.S. EPA) to conduct some extensive sampling to determine if any immediate human health risks existed.

Environmental investigations began at the intersection of Mississippi and Logan Streets. The focus area is between Ohio to the north, Mississippi on the south, Sherman on the west, and Pennsylvania on the east.

Initially, shallow groundwater was sampled to better define the trichloroethylene plume and to determine if there was a need to test for vapor intrusion in homes. The contaminant of concern is TCE, a solvent used primarily to clean metal parts. TCE vapors from contaminated groundwater may migrate into overlying soil and eventually into buildings, usually through cracks or openings in the foundation slab or a crawl space.

During the Spring of 2005, U.S. EPA began some residential sub-slab sampling between Pennsylvania and Sherman Streets to test for TCE vapors.



What Has Been Found?

As of April 2005, the EPA has installed 45 groundwater monitoring wells in the study area. Sampling has been done in both shallow and deep groundwater layers. TCE levels have been found to be less than 500 micrograms per liter, or parts per billion (ppb) in groundwater. Although this is well above the federal and State of Colorado drinking water level of 5 ppb, this water is not used for drinking. A clay layer present through much of the area appears to be acting as a barrier preventing contamina-



tion of the shallow groundwater zone, except near Kentucky and Logan Streets. Most shallow groundwater samples showed either no detect or very low levels of TCE.

Initial sub-slab and crawl space samples from six homes were collected on Pennsylvania, Grant and Sherman Streets. Tests showed either no detection of TCE, or extremely low levels of TCE except at one location. Indoor air at this location will be tested further. Plans for additional investigation of homes and groundwater are being discussed among the government agencies, property owners and developers.

U.S. EPA will coordinate with the Colorado Department of Public Health and Environment and Gates Rubber Company regarding additional sampling of the plume. As a result of U.S. EPA's extensive investigation, the Gates Rubber Company has been notified that the TCE plume at I-25 and Logan Street emanates from a source on the Gates property. The Gates Rubber Company currently has applications pending with the Voluntary Cleanup Program administered by the Colorado Department of Public Health and Environment.



* * * * *
Information Repositories
 Documents regarding the Gates Rubber Company Voluntary Cleanup proposal and the Gates Cherokee Voluntary Cleanup Proposal are available to the public:
The Colorado Department of Public Health and Environment
 Environmental Record Center
 4300 Cherry Creek Drive
 Denver, CO 80246
 303-692-3331
 Monday—Friday 9:00 AM to 5:00 PM

Decker Branch Library
 1501 S. Logan Street
 Denver, Colorado 80210
 303-733-7584
 Call for hours.

Also visit our web sites:
<http://www.cdphe.state.co.us/hm/hmhom.asp>
http://www.epa.gov/region8/superfund/co_sf.html#4
 * * * * *