State of Wisconsin
DEPARTMENT OF NATURAL RESOURCES
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Milwaukee, WI 53212-3128

Tony Evers, Governor
Preston D. Cole, Secretary
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January 14, 2019

Mr. Thomas McKay
McKplaco, Inc.
602 N. 5th St.
Milwaukee, WI 53203

RE: **Request for Site Update**

One Hour Fabricare (Former), 4704 W. Burleigh St., Milwaukee
BRRTS # 02-41-548391 FID # 241352760

Dear Mr. McKay:

The Wisconsin Department of Natural Resources (DNR) is requesting that you complete the investigation of contamination that has been identified at the site referenced above. According to documents in the case file, on December 7, 2006 a discharge from the dry-cleaning equipment that was located within the building was reported to the DNR. Investigation of volatile organic compound (VOC) contamination in soil, groundwater and vapor occurred from 2006 to 2010. In the DNR letter dated June 13, 2014, you were reminded of your responsibility to investigate and remediate the contamination at the site, but no written response has been received from you since our last correspondence.

DNR case file documents indicate that the most recent investigation activities documented by The Sigma Group (Sigma) at the site occurred in 2010. Sub-slab vapor sampling in August 2010 identified high concentrations of vapor-phase VOC contamination beneath the building, which may pose a health risk to occupants within the site building, currently operating as a convenience store. Exposure to these chemical gases or vapors can cause an increased risk of harmful health effects. The vapors that off-gas from dry-cleaning solvents are usually odorless and colorless and undetectable without special testing equipment.

The next necessary steps in the investigation of your site is to determine whether VOC vapors are present within your building, whether the vapor plume has migrated beneath or into the adjacent buildings to the west and north, and if there are human health risks, per Wis. Admin. Code § NR 716.11(4) and (5) requirements for a complete investigation. Under certain conditions, these vapors can move up through foundation floors and walls and enter the indoor air, which is referred to as vapor intrusion. Therefore, the vapor intrusion pathway must be investigated on your property, and beyond the boundaries of the property as necessary to define the extent of contaminant migration.

Sigma included vapor sampling along with additional soil and groundwater investigation in the "Drycleaner Emergency Response Program (DERF) Work Plan," dated February 16, 2012,

which DNR approved in the letter to you dated May 3, 2012. Going forward, the DNR is recommending subslab and indoor air sampling within your building, and within the buildings at 4714 West Burleigh and 3119 North 47th Streets. Although additional soil and groundwater activities are required to bring this site to closure, vapor sampling must be a priority at this time, due to the very high concentrations of VOCs that were detected in the vapor sample collected beneath your building in 2010.

In our telephone conversation on January 9, 2019, you indicated that you may move forward with the indoor air sampling within your building, as the presumption of risk from contamination beneath the foundation is affecting the use of the building at this time. Collecting an indoor air sample now, specifically during the colder months, is a reliable method for investigating the vapor intrusion risk under current use. However, the air sampling methods that you indicated are used to measure solvents in the worker's breathing zone are not adequate for evaluating vapor intrusion risk. The recommended and acceptable methods for vapor sampling are described in the DNR's vapor guidance document, *Addressing Vapor Intrusion at Remediation & Redevelopment Sites in Wisconsin*, January 2018, Publication RR-800, which can be accessed on the DNR's website (dnr.wi.gov) by searching "RR800" on the home page.

I have included excerpts from the DNR's vapor guidance that describe acceptable indoor and ambient air sampling methods, and sampling preparation activities, which all environmental consultants in Wisconsin should be familiar with. I have also enclosed vapor intrusion fact sheets for your reference.

At a minimum, the DNR recommends collecting two air samples now: one from within the site building in the former dry-cleaning equipment area (west side of building), and one background air sample from outside the building. The DNR highly recommends that as soon as indoor air sampling is complete you also have a sub-slab vapor sample collected from beneath the building at or near the 2010 sub-slab vapor sample location, to compare to the previous sub-slab vapor concentrations. This would provide valuable information for evaluating source concentrations over time. The laboratory should report the concentrations for the following nine VOC compounds of concern (detected compounds) at this site: trichloroethene, tetrachloroethene, vinyl chloride, cis 1,2-dichloroethene, benzene, ethylbenzene, toluene, total xylenes and naphthalene. To keep the costs down, the consultant who collects these samples will not be required to provide a detailed report describing the work to the DNR but will have to submit a site figure that indicates where the samples were collected, the laboratory analytical data sheets and a description of their sample collection methods. The cost for these activities may be less than $3,000.

By January 25, 2019, please inform the DNR in writing of your intentions to investigate the vapor intrusion pathway at your building and a timeline for completing the sampling as soon as possible. Have your consultant notify me when the air sampling is going to occur, so that I may be present to document the activities for our file and save some consulting costs.

Be aware that the DNR can pursue enforcement actions if you do not respond to this request for information. In addition, the DNR may contract to have the vapor intrusion investigation activities conducted utilizing State funds, for which the DNR would pursue cost recovery from you. Generally, this could result in a placing a lien on the 4704 West Burleigh Street property until you refund the State or sell the property. If the DNR must contract for the vapor intrusion investigation, in addition to the air sampling within and beneath the building, vapor investigation activities will be conducted on the adjacent properties to the west and north of your site. These activities, roughly estimated to cost between $5,000 and $9,000, would likely cost more for the DNR to conduct than if you contracted for the work. Also, there would be no recourse for you to get the costs reimbursement through the DERF program.

Your prompt attention to this request is appreciated. If you have any questions or concerns, please contact me in writing at the letterhead address or by telephone at (414) 263-8757 or via email at Linda.Michalets@wisconsin.gov.

Sincerely,

Linda M. Michalets
Hydrogeologist
Remediation and Redevelopment Program

Enclosures: *Addressing Vapor Intrusion at Remediation & Redevelopment Sites in Wisconsin*, RR-800, January 2018 (pages 1-2, 26-28, 31, A-2 and A-3)
What to Expect During Vapor Intrusion Sampling, RR-954, February 2014
Understanding Chemical Vapor Intrusion Testing Results, RR-977, October 2014

cc: Mr. Lindor Schmidt, City of Milwaukee Health Department

Remediation and Redevelopment Program January 2018

Addressing Vapor Intrusion at Remediation & Redevelopment Sites in Wisconsin
Wis. Stat. ch. 292; Wis. Admin. Code ch. NR 700

Purpose

The purpose of this guidance is to provide approaches for complying with the requirements in Wis. Stat.ch. 292 and Wis. Admin. Code ch. NR 700 that relate to vapor intrusion. This guidance identifies the conditions where assessment of the vapor intrusion pathway is necessary at contaminated sites; sets out the criteria for evaluating health risk; identifies appropriate responses; explains long-term stewardship; and clarifies when sites with a complete or potential vapor migration pathway may achieve closure.

This guidance is applicable to contaminated sites where volatilization of subsurface contaminants has migrated or has the potential to migrate to current or future occupied buildings. Unless otherwise noted, all provisions in this guidance apply to the responsible party (RP) and/or property owner of a contaminated site.

Related DNR Guidance

- RR-042: DNR Case Closure Continuing Obligations: Vapor Intrusion
- RR-986: Sub-slab Vapor Sampling Procedures

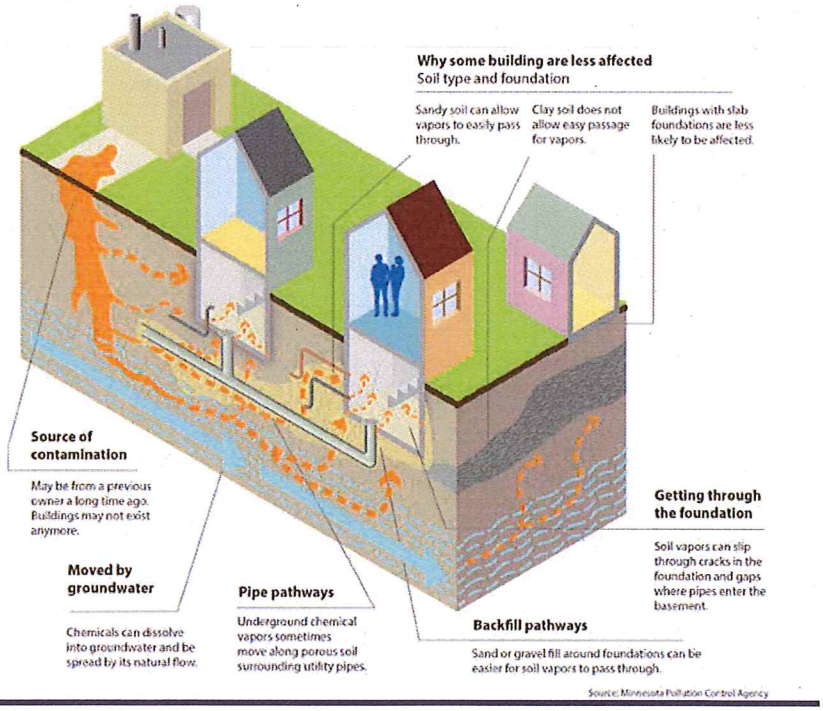
Related DNR Factsheets

- RR-067: Vapor Intrusion Investigation - Information Sheet for Neighbors
- RR-892: What is Vapor Intrusion
- RR-953: Why Test for Vapor Intrusion?
- RR-954: What to Expect During Vapor Intrusion Sampling
- RR-977: Understanding Chemical Vapor Intrusion Testing Results
- RR-934: Who Should I Contact About Vapor Intrusion Investigations?
- RR-973: Environmental Contamination & Your Real Estate

Overview of Vapor Intrusion

Vapor intrusion generally refers to subsurface contamination that can volatilize and the vapors enter the breathing space of buildings. Vapor intrusion can also occur when contaminated groundwater infiltrates buildings and contaminants directly volatilize into the indoor air. Vapors can migrate through air space in permeable soils, fractures in bedrock or clay tills, utilities, sumps, or cracks in the building foundation.

How vapor intrusion happens: **a complex path**



This document is intended solely as guidance and does not contain any mandatory requirements except where requirements found in statute or administrative rule are referenced. This guidance does not establish or affect legal rights or obligations and is not finally determinative of any of the issues addressed. This guidance does not create any rights enforceable by any party in litigation with the State of Wisconsin or the Department of Natural Resources. Any regulatory decisions made by the Department of Natural Resources in any matter addressed by this guidance will be made by applying the governing statutes and administrative rules to the relevant facts.

The Wisconsin Department of Natural Resources provides equal opportunity in its employment, programs, services, and functions under an Affirmative Action Plan. If you have any questions, please write to Chief, Public Civil Rights, Office of Civil Rights, U.S. Department of the Interior, 1849 C. Street, NW, Washington, D.C. 20240.

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- ***Active soil gas sampling*** approaches vary, and investigators are referred to publications by Geoprobe Systems®[21] , U.S. EPA[22] , and U.S EPA (2015a) for additional information on active soil gas sampling. Active soil gas sampling can provide a *quantitative* measure of vapor conditions in the subsurface, which can be compared to vapor risk screening levels. Sub-slab samples are preferred for making this risk determination, but active soil gas sampling are an acceptable alternative when conditions do not allow for sub-slab sampling.
  - ***Devices***: In active soil gas sampling, a sample probe is installed into the ground, the annular space is sealed, air is purged from the sample assembly, and soil gas sample is drawn up using a peristaltic pump, hand pump, other small vacuum, or the vacuum of a Summa canister. Samples are collected in either a Summa canister or a Tedlar® bag.
  - ***Quantitative:*** If soil gas samples will be used as a quantitative measure to evaluate the vapor intrusion pathway, Summa canisters are preferred over Tedlar® bags, and the canister should be fitted with a flow controller that provides at least a 30-minute time-weighted average concentration.

Depth for Soil Gas Samples

The sample depth will depend on site conditions, and multiple depths intervals may be needed. Factors to consider in selecting depth of soil gas samples include:

- **Set at least 3 to 4 feet below ground surface.**
- **Set within 5 feet of depth of building foundation.**
- **Set within utility corridor or other preferential pathway, if applicable.**

- ***Quality control measures*** are completed if soil gas samples will be used as a *quantitative* measure to evaluate the vapor intrusion pathway (i.e., sample concentrations will be compared to vapor risk screening levels). Quality control measures include documenting construction of a good seal between the sample probe and annulus or the soil borehole, and completing leak testing. Leak test methods for soil gas sampling are similar to sub-slab vapor sampling and include a helium shroud, shut-in testing, or other tracer testing (see RR-986).

5.4.3 Indoor air sampling

Indoor air sampling measures the concentrations of volatile compounds present in the indoor air near the sampling device during the period of sampling. Indoor air samples may be collected from a crawl space, basement, and/or other levels of a building. Sampling devices are set near the breathing zone height (if applicable), away from windows and doors, and at locations where they will not be disturbed.

- ***Pre-sampling activities*** are completed, when possible, to prepare a building for indoor air sampling:
  - Inventory and remove items from the building that may contribute VOCs to the indoor air (see **Appendix A** for common background sources). If possible, items should be removed from the building or sample space at least 24 hours prior to sampling.
  - In the summer months, windows should be closed in residential buildings, at least 24 hours prior to sampling and remain closed during sampling to minimize contributions from outdoor air. For non-commercial buildings, windows and doors can continue normal operation.

[20] McAlary, T., et. al. 2014c. Quantitative passive soil vapor sampling for VOCs—Part 3: field experiments. *Environ. Sci.: Processes Impacts* 16(3): 501–510.

[21] Geoprobe Systems®. 2006. Direct push installation of devises for active soil gas sampling & monitoring. Technical Bulletin No. MK3098. May 2006.

[22] U.S. EPA. 2001. Environmental Response Team Standard Operating Procedures, Soil Gas Sampling (SOP 2042). April 18. Currently available online at: http://www.epaosc.org/sites/2107/files/2082-r00.pdf

- HVAC systems should continue to operate as normal, and the operating conditions should be documented and reported as part of the sampling.

- ***Active indoor air sampling*** is one option for measuring indoor air concentrations. Because vapor risk in non-residential settings is based on 8-hour exposure, active sampling set for 8-hours is usually the best approach for sampling indoor air in commercial or industrial facilities. Investigators are referred to U.S. EPA's vapor intrusion guidance (U.S. EPA 2015a) for additional information.

  - ***Summa Canister:*** The most common approach to indoor air sampling uses a Summa canister to draw air into the canister under the influence of the canister's vacuum. This sample is a direct measure of the indoor air concentration near the sampling device during the sampling period. Each canister should be fitted with a flow controller that provides either a 24-hour (residential settings) or an 8-hour (commercial/industrial settings) time-weighted average concentration.

  - ***EPA Method TO-17:*** Another option for active indoor air sampling is EPA Method TO-17. In this approach, the air is drawn through a tube containing an absorbent media using an energized pump. The average concentration in the indoor air is back-calculated based on mass absorbed to the media, the air flow rate of the energized pump, and time duration for sampling. Typically, the sample duration is between 8 to 24 hours.

    Note: Breakthrough can occur if the capacity of the adsorptive media is used up, but air continues to be pumped through the device. Breakthrough will result in a time-weighted average concentration that is biased low relative to the actual vapor concentrations. Careful planning is needed when using EPA Method TO-17 to ensure the volume of air (pumping rate x time) will not cause breakthrough.

- ***Passive indoor air sampling*** is another option to measure indoor air concentrations. Because passive samples can be collected over a longer duration than active samples, passive samples can average out the variability of indoor air. This may be useful in evaluating chronic exposure in residential settings, but may not be representative of exposure in commercial/industrial settings. Investigators are referred to documents by ESTCP (2015), NAVFAC [23], and U.S. EPA [24] for additional information on quantitative approaches to passive indoor air sampling.

  - In passive indoor air sampling, a device with sorbent media is set up to collect a sample via diffusion. The compounds able to be detected during laboratory analysis will depend on the sorbent used. The laboratory should be consulted to select the appropriate sorbent media for the contaminants of concern at a site.

  - Sorbents used within these sampler types can fall into two general categories – very strong sorbents that require solvent extraction and weaker sorbents amenable to thermal desorption. (The extraction here refers to the method the laboratory uses to desorb the contaminant mass from the sampling device for analysis). Stronger sorbents require shorter sample duration, but generally have higher analytical sensitivity.

  - Unlike passive soil gas sampling, passive indoor air sampling can provide quantitative results that can be compared to vapor action levels. The reported laboratory result will be the mass of contaminant retained by the passive sampler. For passive sampling to be a ***quantitative*** measure of indoor air vapor concentration, the time of deployment and compound-specific uptake rate for the adsorptive media must be known.

[23] NAVFAC. 2015. Passive sampling for vapor intrusion assessment. TM-NAVFAC EXWC-EV-1503. July 2015.
[24] U.S. EPA, 2014b. Engineering Issue: Passive samplers for investigation of air quality. Method description, implementation, and comparison to alternative sampling methods. EPA/600/R-14/434. December 2014.

Passive Vapor Concentration = Mass / (Uptake Rate * Time)

Concentration ($\mu g/m^3$)	Vapor concentration that can be compared to VAL for the contaminant
Mass (pg)	Mass of contaminant retained on sampler reported by lab (picograms)
Uptake Rate (mL/min)	Published look-up values that vary by sampling device and contaminant
Time (min)	Duration a passive sampler is deployed, usually days to weeks

- There are three main styles of passive sampling devices, which include tube (e.g., Drager ORSA), badge (e.g., SKC Ultra), and radial (e.g., Radiello) samplers. The style selected influences the *uptake rate*, and most passive samplers have published uptake rates for specific compounds.
- The minimum (and maximum) *time* that should be used for a passive sample can be calculated based on uptake rate, reporting limit, and expected mass. Passive samplers are often deployed for several days to several weeks.
- Because passive sampling devices can collect samples over a longer duration than active methods, passive samples can be a better indicator of chronic exposure in residential settings. This makes them useful in some situations, but may not be appropriate in all cases (e.g., evaluating acute risk for TCE in indoor air).

5.4.4 Ambient air (Background) sampling

Ambient air samples are collected from outdoors to evaluate background concentrations, and are recommended anytime indoor air or shallow soil gas samples are collected. The outdoor sample should be collected using the same procedures as the indoor sample. Sampling devices should be set upwind, near the building(s) undergoing testing, and at a location where the device is secure and will not be disturbed.

5.5 SCOPING AN INVESTIGATION

5.5.1 Laboratory Methods and Reporting

The laboratory method will depend on the sampling devices used in the investigation. EPA Method TO-15 is the most common laboratory method to analyze vapor samples collected in Summa canisters. Other laboratory methods are available for different sampling devices, and these should be selected with assistance from the laboratory to fit the reporting needs for the site.

The list of analytes reported by the laboratory should be limited to the contaminants of concern when possible.

- ***For sub-slab or soil gas samples***, if the contaminants of concern are established prior to vapor sampling, the list of contaminants reported by the laboratory should be limited to the contaminants of concern for a site. If there is uncertainty in the contaminants of concern, the full list of VOCs should be reported by the laboratory for the first round of samples, but if additional samples are needed, the list of contaminants reported by the laboratory should be limited to the VOCs detected in the first round of sampling.
- ***For indoor air samples,*** the list of contaminants reported by the laboratory should be limited to the contaminants of concern for a site. There are many other sources contributing to indoor air quality, and limiting the laboratory report to the contaminants of concern for the site helps to focus the evaluation and will simplify the explanation of the results to owners and occupants of buildings. If contaminants of concern are not known, consider the option to analyze sub-slab samples first, and then select the list of analytes for indoor air samples based on what was detected in sub-slab samples.

6 EVALUATING VAPOR INTRUSION INVESTIGATION DATA

After vapor samples are collected, the next step is to determine whether concentrations present a risk to current or future users of a building.

6.1 BACKGROUND VAPORS

If indoor air samples were collected, it is important to remember that VOCs detected in indoor air may not have originated from the discharge of hazardous substance. There are many other contributing sources to indoor and outdoor air quality[25].

Measured concentrations of contaminants that are not the result of a hazardous substance discharge *do not* require further action under Wis. Stat. ch. 292. If concentrations detected in indoor air are determined to be primarily due to sources other than a discharge of a hazardous substance or presence of environmental pollution in the subsurface, then the vapor intrusion pathway may be ruled out. However, action may be required by other regulatory agencies or health officials.

- ***Background Outdoor Concentrations:*** VOCs can exist in outdoor air because of combustion processes, and from other industrial or commercial sources. For the purpose of a vapor intrusion assessment, these are considered to be background outdoor concentrations. Because outdoor air contributes to the quality of indoor air, the concentrations measured in the background outdoor air sample can typically be subtracted from the measured indoor air concentrations if the samples were taken on the same day and in proximity to one another.
- ***Indoor Background Sources:*** VOCs also routinely exist in indoor air because of typical household items (e.g., recently dry cleaned clothes, oil based paints, cleaners). A list of typical sources to VOCs in indoor air can be found in **Appendix A**. For the purpose of a vapor intrusion assessment, these are considered to be background sources of VOCs. Where possible, background sources should be identified and removed 24-hours prior to indoor air sampling. The potential contribution from background sources in indoor air samples should be evaluated and documented.
- ***OSHA Regulated Settings:***[26] When the contaminant of concern is also a chemical used in a manufacturing or commercial process, OSHA (Occupational Safety and Health Administration) standards or other occupational inhalation exposure guidelines apply to the occupational exposure in the indoor air as long as the entity continues to use the chemical in question. Once the OSHA standards or occupational exposure guidelines no longer apply at a building, then the indoor air must meet the vapor action levels discussed below.

6.2 VAPOR ACTION & VAPOR RISK SCREENING LEVELS

To evaluate the vapor sampling results, the data are compared either to Vapor Action Levels (VALs) for indoor air or to Vapor Risk Screening Levels (VRSLs) for subsurface samples.

[25] U.S. EPA, 2011. Background indoor air concentrations of volatile organic compounds in North American residences (1990-2005): a compilation of statistics for assessing vapor intrusion. EPA/530/R-10/001. June 2011.

[26] Indoor air is usually not sampled at OSHA regulated facilities during a vapor intrusion investigation; however, sub-slab vapor samples are still collected. In some cases, vapors from the indoor air may be able to migrate into the subsurface and affect the sub-slab vapor concentrations. If movement of vapors from indoor air into the subsurface is a concern, then indoor air sampling may be needed to make this determination.

APPENDIX A – BACKGROUND VAPOR SOURCES

COMMON HOUSEHOLD SOURCES OF BACKGROUND INDOOR AIR CONTAMINATION LISTED BY CHEMICAL[1,2]	
Acetone	rubber cement, cleaning fluids, scented candles and nail polish remover
Benzene	automobile exhaust, gasoline, cigarette smoke, scented candles, scatter rugs and carpet glue
Bromomethane	soil or space fumigant
1, 3-Butadiene	automobile exhaust and residential wood combustion
2-Butanone (MEK)	automobile exhaust, printing inks, fragrance/flavoring agent in candy and perfume, paint, glue, cleaning agents and cigarette smoke
Chlorobenzene	scented candles, plastic foam insulation and paint products
Chloroethane	Refrigerant
Chloroform	generated from chlorinated water (showers)
Cyclohexane	gasoline, paint thinner, paint and varnish remover
1,4-Dichlorobenzene	moth balls, general insecticide in farming, air deodorant and toilet disinfectant
Dichlorodifluoromethane	refrigerant (CFCs) and cleaning solvent
1, 1-Dichloroethane	plastic products (food and other packaging material) and flame retardant fabrics
1,2-Dichloroethane	molded plastic objects/decorations (particularly from China), cigarette smoke, PVC and vinyl floor adhesives[3]
1, 3-Dichloropropene	fungicides
Ethylbenzene	paint, paint thinners, insecticides, wood office furniture, scented candles and gasoline
Formaldehyde	building materials (particle board), furniture, insulation and cigarette smoke
n-Heptane	gasoline, nail polishes, wood office furniture and petroleum products
n- Hexane	gasoline, rubber cement, typing correction fluid and aerosols in perfumes
Methylene chloride	hairspray, paint stripper, rug cleaners, insecticides and furniture polish
Methyl isobutyl ketone (MIBK)	paints, varnishes, dry cleaning preparations, naturally found in oranges, grapes and vinegar
Methyl *tert* butyl ether (MTBE)	gasoline (oxygenating agent)
Naphthalene	cigarette smoke, automobile exhaust, residential wood combustion, insecticides and moth balls
Styrene	cigarette smoke, automobile exhaust, fiberglass, rubber and epoxy adhesives, occurs naturally in various fruits, vegetables, nuts and meats
Tertiary butyl alcohol (TBA)	gasoline (oxygenating agent)
1,1,2,2-Tetrachloroethane	solvent, paint and rust removers, varnishes and lacquers
Tetrachloroethene (PCE)	dry cleaning, metal degreasing, adhesives and glues, insecticides, scented candles and rug cleaner
Toluene	gasoline, automobile exhaust, polishes, nail polish, synthetic fragrances, paint, scented candles, paint thinner, adhesives and cigarette smoke
1, 1, 1-Trichloroethane	spot cleaner, glues, insecticides, drain cleaners, shoe polish
Trichloroethene (TCE)	glues, adhesives, paint removers, spot removers, rug cleaning fluids, paints, metal cleaners, and automotive cleaning and degreasing products
1, 2, 4 and 1,3,5 - Trimethylbenzene	gasoline and automobile exhaust
Xylenes, total	water sealer, gasoline, automobile exhaust, markers, paint, floor polish and cigarette smoke

[1] Department of Defense (DOD). 2009. DoD Vapor Intrusion Handbook. Prepared by the Tri-Service Environmental Risk Assessment Workgroup. January 2009.

[2] New Jersey Department of Environmental Protection (NJDEP). 2016. Vapor Intrusion Technical Guidance, Appendix H. NJDEP, Site Remediation and Waste Management Program, Trenton, NJ. August, 2016. http://www.nj.gov/dep/srp/guidance/vaporintrusion/vig_appendices.pdf

[3] Kurtz, J.P. et. al. 2010. Evidence for increasing indoor sources of 1,2-dichloroethane since 2004 at two Colorado residential vapor intrusion sites. *Ground Water Monitoring and Remediation*. 30, no. 3: 107-112.

APPENDIX A – BACKGROUND VAPOR SOURCES

COMMON HOUSEHOLD SOURCES OF BACKGROUND INDOOR AIR CONTAMINATION LISTED BY PRODUCT
NOTE: Analysis of indoor air should be specific to the VOCs expected from soil and/or groundwater contamination. (e.g.if CVOCs are the target chemical, then items containing CVOCs should be removed from the building at least 24 hours prior to sampling.)
Fuel containers or devices using gasoline, kerosene, fuel oil and products with petroleum distillates: - paint thinner - oil-based stains and paint - aerosol or liquid insect pest products - mineral spirits - furniture polishes
Personal care products: - nail polish - nail polish remover - colognes and perfumes - rubbing alcohol - hair spray
Dry cleaned clothes, spot removers, fabric/ leather cleaners
Household Cleaners - Oven cleaners - Carpet/upholstery cleaners - Bathroom cleaner - Appliance cleaner - Citrus (orange) oil or pine oil cleaners - Furniture/floor polish
PVC cement and primer, various adhesives, contact cement, model cement
Paint stripper and adhesive (glue) removers
Degreasers and cleaning solvents, such as: - aerosol penetrating oils - brake cleaner - carburetor cleaner - commercial solvents - electronics cleaners - spray lubricants
Moth balls and moth flakes
Aerosol spray products: - paints - cosmetics - automotive products - leather treatments - pesticides
Deodorizers, air fresheners, scented trees, potpourri, and scented candles
Hobby supplies
- paints and lacquers - solvents - glues - photo darkroom chemicals

PUB-RR-954
Feb 2014

Wisconsin DNR vapor intrusion **quick facts**

What to Expect During Vapor Intrusion Sampling

The sampling procedure for vapor intrusion is performed by health and environmental professionals. It involves drilling one or more small holes into the basement or lowest level of your building, collecting a vapor sample from those holes - also called ports - and then sending the sample to a specialized lab for analysis. This is called sub-slab sampling. Sampling professionals try to minimize any inconveniences to you by informing you up front on what to expect and working with your schedule on the days of sampling.

Vapor sampling provides information about the extent of potential contamination in your neighborhood.

Should I be on site for the sampling?

It's up to you. Sampling professionals will need to be let in to install the testing equipment and collect the samples. The arrangements you make are completely dependent on your availability and comfort level with others on your property.

How many times will sampling professionals enter my property, and how is sampling done?

In general, you should plan on two or three visits over two or three days. While the actual sampling procedure and schedule may vary, the following provides a typical approach:

Day 1: The first day includes locating suitable locations for port installation, then drilling and installing the ports. This usually takes about an hour or two.

Day 2: The second day involves attaching the collection canister to the port to begin collecting the samples. A 24-hour indoor air sampling kit may also be set up. This visit will also take an hour or two.

Day 3: The third day is a shorter visit to gather all of the sampling equipment and seal off the ports. Sometimes the port site is left in place in case samples may need to be collected in the future.

Why not take indoor air samples instead of sub-slab samples?

Indoor air quality often changes from day to day, creating misleading assumptions about long-term indoor air quality. Indoor air quality may be affected by vapors given off by household or commercial products including paints, glues, fuels, cleaners, cigarette smoke, aerosol sprays, new carpeting or furniture. Also, any outdoor air that enters the inside of your house may also contain vapors which can alter test results. By itself, indoor air testing will not necessarily confirm that the vapors in the indoor air are entering a building from underground sources. However, indoor air samples are usually collected at the same time as the sub-slab samples for comparison purposes.

WISCONSIN DEPT. OF NATURAL RESOURCES

Wisconsin Department of Natural Resources
P.O. Box 7921, Madison, WI 53707
dnr.wi.gov, search "Brownfields"

Environment · Remediation and Redevelopment Program · Redevelopment · Partnership · Cleanup

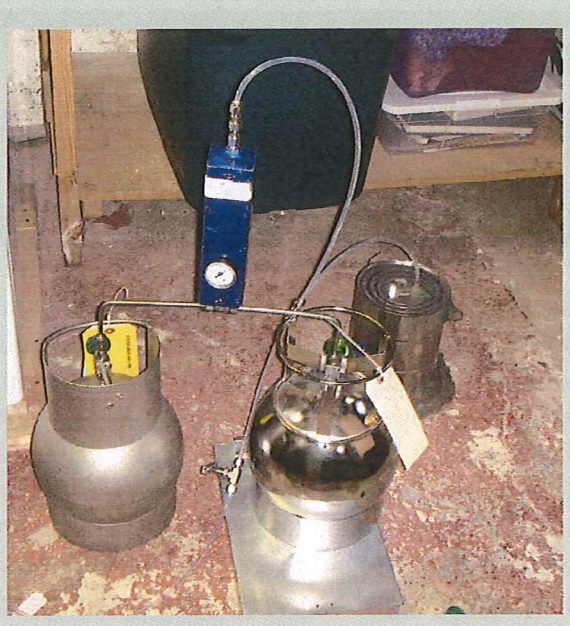
What if there is a crawl space instead of a basement?

If there is a crawl space or a basement with a dirt floor, it is not possible to install a port. In these cases, a sample of air is collected from the crawl space or basement over a 24 hour period. Sometimes a port can be installed in the side wall of the foundation.

Who pays for testing, and when will I get the results?

In many cases, the responsible party (the person or business legally obligated to investigate and clean up the environmental contamination) pays for the testing. The responsible party may also pay for the installation of a mitigation system if it is necessary. Sometimes, other parties such as DNR or the Dept. of Health may pay for testing. As long as the property owner provides reasonable and timely access for testing, rarely would they be responsible for the cost.

The laboratory results are usually available in two to four weeks and will be shared with you through a state or local health agency, the Wisconsin DNR, the responsible party or a hired consultant. An explanation of the findings and additional steps to be taken, if any, will also be provided.



A sub-slab vapor sampling system is usually in place for a day or two during the sampling process. The metal canisters (foreground) collect the vapor sample from the port (smaller canister in back of photo). The same canisters can be used to collect indoor air samples.

Where can I find more information?

Health and vapor-related information can be found at the Wisconsin Department of Health Services (DHS) website at **dhs.wisconsin.gov** , search "Vapor." For other health-related questions, please contact your local health department: **www.dhs.wisconsin.gov/localhealth**.

For more DNR information, please visit the DNR's Remediation and Redevelopment (RR) Program's Vapor Intrusion page at **dnr.wi.gov/topic/Brownfields/Vapor.html**.

Additional information can be obtained through the DNR field office in your region. To find the correct office, visit the RR Program Staff Contacts page at **dnr.wi.gov/topic/Brownfields/Contact.html** or call the RR Program at (608) 266-2111.

Understanding Chemical Vapor Intrusion Testing Results

RR-977 October 2014

From the Lab to You

Chemical vapor samples were taken from underneath your house or building and possibly indoors as well. These samples have been tested by a certified laboratory and a report was issued. The Wisconsin Department of Natural Resources (DNR) uses these test results to determine if people in the building are being exposed to chemical vapors coming from nearby contaminated soil or groundwater, and to decide what, if any, action is needed to prevent this exposure.

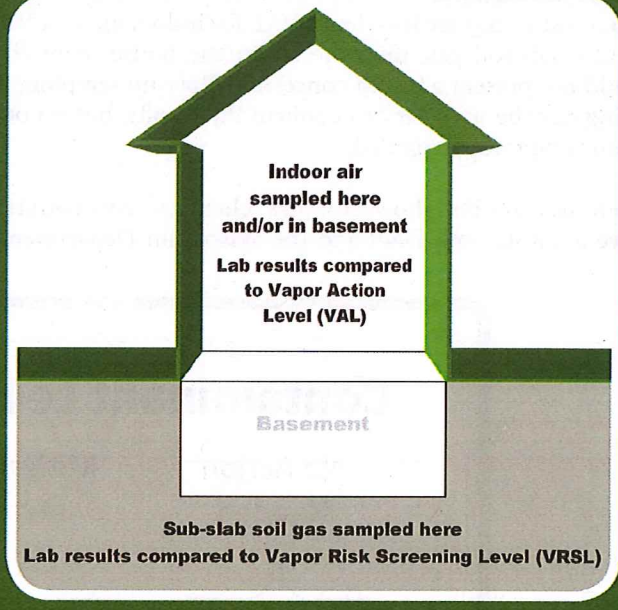
Indoor Air Testing Results

If indoor air samples were collected in your house or building, test results from the lab will be compared to the state Vapor Action Level (VAL) for chemicals of concern. The VAL is a chemical compound's numerical value that represents a health hazard risk to no more than 1 in 100,000 people during a lifetime of exposure. If test results show chemical concentrations in your air below the VAL then adverse health effects are extremely rare, even if you were to breathe the chemical at this concentration for your entire life.

Test results showing chemical concentrations in the air at or above the VAL prompt DNR to recommend that exposure to these chemical vapors be reduced. If test results show concentrations significantly above the VAL, or more than one type of chemical vapor is identified in your indoor air, the risk from exposure increases. If the concentration of any indoor chemical vapor greatly exceeds the VAL, DNR is concerned about even short-term exposure and will typically require immediate action to address the problem.

The VAL for each chemical is set by scientific research. It is protective of all people, including those who are most susceptible to adverse health effects.

If test results identify chemicals in your air that are not present in nearby soil or groundwater contamination, it is likely that these vapors are coming from some product or activity in or near your house or building. Many everyday consumer products (e.g., cleaners, solvents, polish, adhesives, lubricants, aerosols, insect repellants, etc.); combustion processes (e.g., smoking, home heating); fuels in attached garages; dry cleaned clothing or draperies; and occupant activities (e.g., craft hobbies), also release chemical vapors into the air.



The air and soil gas samples from your property are tested at a laboratory. Chemical concentrations are measured and the results are compared to state health-risk numbers.

Sub-slab Soil Gas Testing Results

Soil gas samples were collected from the ground beneath the concrete slab of your building foundation or basement. The lab measured the concentrations of various chemicals in these samples. DNR compares these measurements to the state Vapor Risk Screening Level (VRSL), which identifies the concentration of a chemical in soil gas that scientific research suggests can be a health risk if vapor enters a building. If soil gas measurements exceed the VRSL for a chemical of concern, action to reduce exposure is strongly recommended.

The VRSL is a higher number (higher chemical concentration) than the VAL because it is presumed that concrete building foundations and basement walls will prevent most soil gas from entering a building. Further, any soil gas that does enter a building through cracks, holes, sump pumps, drains, etc., will be diluted to some extent by the indoor air. So, people inside will not be breathing air that includes the full concentration of chemical vapors that exist in the ground.

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DNR generally relies on the test results of the sub-slab soil gas samples when determining what, if any, action should be taken related to chemical vapors coming from nearby soil or groundwater contamination. Indoor air quality is highly variable, and it is difficult to make a definitive decision about vapor intrusion based on indoor air sampling alone.

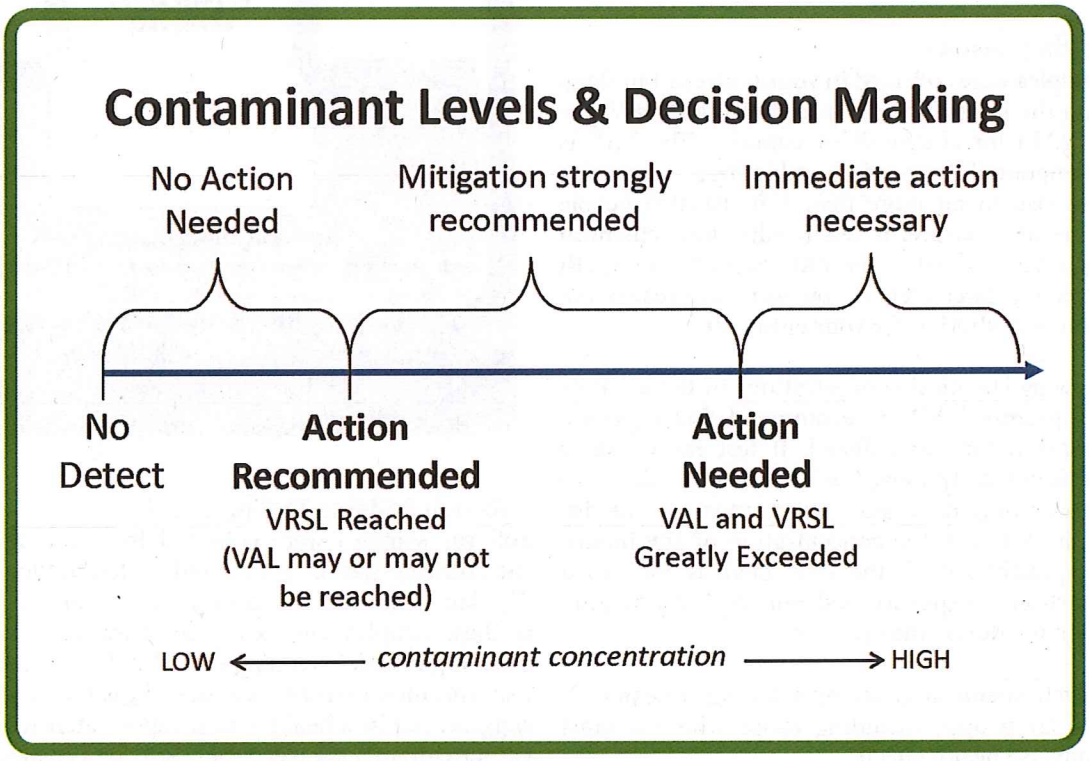
Follow-Up Actions

If your test results are less than a VAL for indoor air, or a VRSL for sub-slab soil gas, then the air in the house or building should not present a health concern. Follow-up sampling and testing may be necessary to confirm the results, but no other action is typically suggested.

When test results show soil gas chemical concentrations above a VRSL, both DNR and the Wisconsin Department of Health Services recommend that owners take action to reduce potential exposure. This typically involves installing a vapor mitigation system that vents chemical vapors from beneath your home or building to the outdoors, similar to a radon mitigation system.

If indoor air concentrations exceed a VAL, but sub-slab concentrations are less than a VRSL, then the chemical vapors are most likely coming from indoor sources. Steps should be taken by the house or building owner to identify the products and practices causing the problem and implement appropriate remedies.

If soil gas mitigation is recommended, a representative of the party who is responsible for the soil or groundwater contamination will contact you to discuss your options.



A Note about Measurement Units: The lab report may include some unfamiliar technical language. The most important point to note is whether or not the test result for a specific chemical exceeds a VAL or VRSL, which are also sometimes referred to, generically, as "screening levels."

The concentration of gaseous pollutants in air is typically described in two different ways: 1) as units of mass per volume, where µg/m3 represents micrograms of gaseous pollutant per cubic meter of ambient air; and 2) as parts per billion by volume (ppbv), where the volume of a gaseous pollutant is compared to a set volume of ambient air. These are the numbers that are compared to the VAL and VRSL.

For more information, visit dnr.wi.gov/topic/Brownfields/Vapor.html