

SSUES & Trends

Passive Air Sampling for Vapor Intrusion

Issues & Trends - 2022 Jennifer Borski and Jim Walden

Zoom Logistics

- □ All attendees muted
- To comment or ask questions, use chat or raise hand
- Send questions toJennifer Borski
- Q&A session open at end of presentation



Today's recording will be available at dnr.wi.gov, search "RR Training Library"



Public Input Opportunities

□ Public input Nov. 17, 2022 RR-0141 VPLE Guidance **RR-627 USTs** RR-973 Environmental **Contamination and Your Real** Estate

□ Coming Soon

- RR-0124 Sediment Guidance
- RR-800 Vapor Intrusion Guidance
- RR-982 Post Closure **Modifications**

| Environmental Contamination | ۵ | | | | |
|---|---|---|--|--|--|
| d Redevelopment Program | November 2022 | | | | |
| vironmental Contaminat | ion & Your Real Estate | | | | |
| act the market value of your home or prop- fects of environmental contamination – hu ing – can be managed. For example, in hoo us, a special ventilation system can be inst acting inside the home. Such systems are d as an acceptable remedy to this naturally lar systems or other remodes exist to mith human activity (e.g., vapors from petroleu | ntr. The purpose of this purdance is to the purpose of this purdance is to the major communication of the property and the analysic custom of their property and the legal deligations they have should the purpose to sold in the future. | | | | |
| t a property, owners should know that if th i in the future, they may be required by e certain conditions about the property. | ay are which a home will sell within a | | | | |
| am I required to disclose | Wisconsin DNR - VPLE | ê 🌉 | | | |
| Wisconsin and are planning to sa any "defects," as defined in ch. 7 | Remediation and Redevelopment Program | November 2022 | | | |
| nt adverse effect on the value of 1 pair the health or safety of future | Guidance: Voluntary Party Liability Exer | nption | | | |
| emoved or replaced, would signi ct the expected normal life of the | Wis. Stat. § 292.15 | <image/> <text><text><text><text><text><text><text><text><text><text><text><text></text></text></text></text></text></text></text></text></text></text></text></text> | | | |
| sclosure requirement? | The purpose of this guidance is to provide information about the vol which was created by the Wisconsin State Legislature in 1994 when was enacted to aid in the redevelopment of brownfield properties. | untary party liability exemption (VPLE), Wisconsin Statutes (Wis. Stat.) § 292.15 | | | |
|). Standard real estate forms are a perty and vacant land comply wi Pre-purchase investigations and | Contents | | | | |
| mercial real estate transactions ar tify environmental issues. | VPLE Fundamentals | | | | |
| Real Estate Condition Report Fo | Types of COCs How to Participate in the VPLE Process | 2 | | | |
| tions of radon, radium, lead and | Table 1 - Comparison of the VPLE and traditional processes | | | | |
| ated to hazardous or toxic substa nartias | Frequently Asked Questions | | | | |
| d Disclosure Form includes ques ns of environmental rules; the pr rage tanks; subsoil conditions the | VPLE Fundamentals The VPLE program is a process by which a person conducts an environme investigation and cleanup of a property volumntily and then receives limits their liability features in this state of the property. | en Wisconsin DNR – Enviror | mental Contamination | e 4 | |
| no accornen si conenzazo sorary al pisoanee a und in sinisie er administrative rule are refe any metter addressed by this guidence will l | What are the benefits of the VPLE program? | volonment Dredtern | Newsylter 0000 | | |
| Sexemi foolz. | Many developers, lenders, and prospective purchasers of brownfields choose this route because the VPLE program provides certain liability assurances helpful to investors and future property owners. Benefits o participating in the VPLE program may include: | Guidance: Register | ing and Removing Unde | rground Storage | |
| | Assurance that contamination on a property was cleaned up to the satisfaction of the state. | e Wis. Admin. Code Ch. AT | CP 93 | | |
| | Transferbility of the exemption in future revents. Liability provides in this event the change standards change its discharge that runs the robject of the change in discovered to be How in the VPLE process different than traditional changes Successful couplicities of the VPLE process provides as exemption in the subject of the change, while a case chose letter applies to a pays the VPLE process. Provides to the VPLE process provides as the VPLE process Provides and the VPLE process provides as the VPLE process Provides and the VPLE | e remed to e promote of this guidance is to e princip responsibilities for more ex proces best practice for registrating and expression strategy tanks. The problem of the practice for registrating and removing underground storage tanks. | Peppes The Wincessin Department of Agriculture, Trafe and Consume Power to southing responsibilities for underground mergers that. The background mergers that, the set practices for engineen tasks. | | |
| | | Best Practice Suggestion Plan ahead. Check the stat identify registered undergr cleanup or construction w | IS e database of registered storage tanks to ound storage tanks before beginning ork at a property. Visit the DATCP | Local Government Responsibilities Local governmental units are required to comply with Wis. | |
| | Publication R4.0111 The document invested advises an applicate and does not rear- fored in manies advancementaries rule areas advanced do regit in an ensite advanced by the publicase will be read on apply released base. | on my ma in my ma ing data and set de an Contact a DATCP tank sp questions, inquire about it you have acquired all relet Visit the DATCP Storage Contacts " in the right-side | Storage Task worksin med select "Storage Tank Database" in the right-storage task worksin med select "Storage Tank Database" in the Admin storage Task worksing task and extensions, net med select (with the DATCP Storage Task tensions and select "Storage Task Construction in the right-storage task tensions, and select toning the DATCP storage Task tensions and select "Storage Task toning". | | |
| | | Hire a qualified environment historical research on the p underground storage tanks property uses. Visit dan wi environmental consultant ² If an underground storage tank service company or te | ntal consultant and/or do your own roperty to assess if any unregistered may exist on the property from past gov and search "selecting an tank is found, hire a DATCP-certified chmician to appropriately clean and | public initand lake protection and rehabilitation district, metropolitani sewerage district, a redevelopment authority created under Wis. Stat. 66.1333, epublic body designated by a municipality under Wis. Stat. 66.1337(4), a community development authority, or a housin | |
| | | remove the tank. Visit the select "Struct Companies inde quick limits. If contamination is identified aroun notify the Wisconsin Department immediate in accordance with W meed an immediate response by co 1.400-403.0025. Report non-enter Notification for Hanatolous Johum Ook by visiting darn to go and is | DATCP Storage Tank website and and Service Technicians" in the right- and Service Technicians" in the right- sol or near the tank during tank removal, of Manual Resources (DNR) is Stat [592.11 Report pulls that ling the 3-Houre mergency holline at gency spills by using the calline ac Duckarge Form — Non-Emergency arching "sybmittal postal." | authority. The local government environmental liability exemption set forth in Wis. Stat. § 1921.1109(1) does not exempt local governmental units from regulations related to underground storage tanks. | |
| | | Publication: RR-627 This deconvert for a status dra: wi.gav releases face. The Baconvir, of arctioneses, of arctioneses, of arctioneses, of arctioneses, of arctioneses, of our | in internet archive an paidome and does not contain our y or administration rule are referenced, does regulatory de dérasard by visus guidence will be made by applying the p Department of Flastavel Researces (DNR) is committed or al passies. File ensure fairs we do not discriminate to al passies. File ensure fairs we do not discriminate to allow possibles or in request fairs | nandatory: regularments accept where requirements testions made by the Degenment of Natural Restor- overeing statutes and administrative rules in the growning diversity, fairwase, equity, and the growing phenemetric groupmane, distations, accision or delatory of formal Group growing, faultice, and the series of formal states growing. The state targe, and is also and the state state states and the states and the states and the states and the states are states and the | |
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Wisconsin DND

Guidance: Er Vis. Stat. ch. 70

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As a seller, what f you own real estate : Have a signif

How do I meet the commercial, vacant lans owners of residential pr disclosure requirements disclosure duties in com rigorous and should ide

The Residentia questions regar-unsafe concert hazardous subs or conditions re-neighboring pro 2. The Vacant Law material violati-underground str

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Public Input Opportunities

https://dnr.wisconsin.gov/topic/brownfields/publicnotices.html

0 in 🙃 🦻 f 🏏 WISCONSIN DEPARTMENT OF PARKS CLIMATE ENVIRONMENT FORESTRY LICENSES NEWS ABOUT CONTACT HUNTING » TOPIC » BROWNFIELDS: REDEVELOPMENT OPPORTUNITIES **REMEDIATION & REDEVELOPMENT PROGRAM PUBLIC NOTICES** Brownfields: Redevelopment Opportunities Remediation & Redevelopment (RR) Program public notices and public comment opportunities are listed below.

External advisory group meeting information can be found on each group's webpage and on the DNR Hearings and Meetings Calendar,

Find trainings and presentations offered by the RR Program on the <u>RR Program presentations & trainings</u> webpage.

Program Guidance Public Notices

PROGRAM GUIDANCE

The RR Program welcomes input on all program guidance. Current guidance can be found using the search tools listed on the RR Program Publications and Forms page. To offer feedback on current RR Program guidance, you can email the staff contact listed in the specific guidance document or DNRRRGuidance@wisconsin.gov

The following table lists guidance in development or under active review by the program. Email the staff contact listed in the table below to share feedback. Staff will review and consider comments received to improve the quality of the guidance.

There are no program guidance postings for public comment at this time.

Q

RR Report Newsfeed

Find Contaminated Land Activities

Request Green Team Assistance

Submit Files Related to ch. NR 700, Wis, Adm, Code

Report a Spill

Environmental Contamination & Cleanup

Related Links

For Environmental Professionals

Subscribe to RR Report Newsfeed for Notifications

SIGN UP:

dnr.wisconsin.gov/topic/Brownfields/News.html



Remediation and Redevelopment External Advisory Group

Subgroup Meetings December 9, 2022 GEF 2 Building – Madison □Contaminated Sediment □NR 700 **Funding Sustainability** Environmental Justice RR EAG Meeting January 27, 2023 Location - TBD







Jennifer Borski Dry Cleaning and Vapor Intrusion Team Leader



DNR Vapor Intrusion Guidance – RR-800, v. Jan 2018

https://dnr.wi.gov/DocLink/RR/RR800.pdf

Wisconsin DNR - Vapor Intrusion



Remediation and Redevelopment Program

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

 <u>RR-042: DNR Case Closure</u> <u>Continuing Obligations: Vapor</u> <u>Intrusion</u>

 <u>RR-986: Sub-slab Vapor</u> Sampling Procedures

Related DNR Factsheets

 <u>RR-067: Vapor Intrusion</u> <u>Investigation - Information</u> <u>Sheet for Neighbors</u>

 <u>RR-892: What is Vapor</u> Intrusion

 <u>RR-953: Why Test for Vapor</u> Intrusion?

 <u>RR-954: What to Expect During</u> Vapor Intrusion Sampling

- <u>RR-977: Understanding</u> <u>Chemical Vapor Intrusion</u> Testing Results
 - <u>RR-934: Who Should I Contact</u> <u>About Vapor Intrusion</u> <u>Investigations?</u>

 <u>RR-973: Environmental</u> <u>Contamination & Your Real</u> 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



Publication: RR-800

dnr.wi.gov Search: vapor intrusion

Passive Sampling in RR-800, v. Jan 2018

• Section 5.4.2 Soil gas sampling

Quantitative passive diffusion methods are currently under development and could be used in lieu of active soil gas sampling if the investigator can show the passive diffusion method will provide an accurate quantitative measure of the soil gas concentrations.

• Section 5.4.3 Indoor air sampling

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.

Wisconsin Administrative Code

Wis. Admin. Code § NR 716.11(3)

(3) The purposes of the field investigation shall be to:

(a) Determine the nature, degree and extent, both areal and vertical, of the hazardous substances or environmental pollution in all affected media.

Wis. Admin. Code § NR 716.11(5)

(5) The field investigation shall include an evaluation of all of the following items:

(g) The presence and concentration of vapors sub-slab, when investigation of soil, soil gas or groundwater indicates that vapors may migrate to the foundation of an occupied building, taking into account the biodegradability of vapors, preferential pathways of vapor movement, or other physical or chemical factors affecting vapor movement into occupied buildings.

(h) The presence and concentration of vapors in indoor air, when it is necessary to determine the impact on an occupied structure considering applicable attenuation factors, land use, building size and other site-specific factors that affect exposure to vapor.

Wisconsin Administrative Code

Wis. Admin. Code § NR 716.13(1)

NR 716.13 Sampling and analysis requirements. (1) Responsible parties shall use laboratory analyses of environmental media samples which are collected, handled and analyzed in compliance with subs. (2) to (17) to confirm the nature and extent and evaluate the impacts of contamination, if a field investigation is required under s. NR 716.11 (1). Analytical methods used shall be suitable for the matrix, type of analyte, expected level of analyte, regulatory limit, and potential interferences in the samples to be tested.

DNR Vapor Intrusion Guidance - RR-800



Wisconsin DNR - Vapor Intrusion



Remediation and Redevelopment Program

Addressing Vapor Intrusion at Remediation & Redevelopment Sites in Wisconsin

Wis. Stat. ch. 292; Wis. Admin. Code ch. NR 700



Recommended Indoor Air Sampling Proposed RR-800 Revision

Initial Sampling Event

How:

- Why: Assess likelihood of acute exposure
- **When:** As soon as possible after a building screens-in for VI
 - 8-hr (workplace) or 24-hr (residential)
 - TO-15, TO-17, passive
 - Could also initiate longer duration sample
 - Paired with sub-slab sample(s)

Recommended Indoor Air Sampling Proposed RR-800 Revision

Follow-up Sampling

- Why: Confirm initial results by sampling when concentrations are likely to be higher but more variable
- When: Winter Assessment Period (Dec. 1 March 31)
 - Most compounds and situations: two events (paired sub-slab most events)
 - TCE: Three events with specific time frames
 - Nov. 15 Dec. 31
 - January
 - March 1 April 15
- **How:** Long-duration: > 10 days ideal, 7 days acceptable

Alternative, reasoned approaches are allowed/encouraged depending on site/building specific conditions

RR-800 Version 2018 vs Update

Residential Example

| | RR-800 v. 2018 | RR-800 Update |
|---------------------------------|----------------|---------------|
| TCE | | |
| Number of events | 3 | 4 |
| Days of data | 3 | 31+ |
| Days during higher VI potential | 1 | 30+ |
| Other compounds | | |
| Number of events | 3 | 2-3 |
| Days of data | 3 | 20+ |
| Days during higher VI potential | 1 | 20+ |

Assumes longer duration events are 10 days or longer



Jim Walden Vapor Intrusion Technical Expert



Passive Sorbent Samplers

- Primary Advantage: Time integrated concentrations for up to several weeks (some samplers achieve reporting limits < Vapor Action Levels within hours).
- Ancillary Advantages (over canisters)
 - Shelf life
 - Availability
 - Rapid deployment
 - Small size
 - Reduced shipping costs & carbon footprint
 - No vacuum

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However:

There are additional considerations with passive samplers to provide the highest quality data.

Canister use beyond 24-hour durations



If used, provide support that the device collects a true time-weighted average concentration for the duration sampled.

Passive Sorbent Samplers

- Radial, Axial, Badge, Membrane
- Different Sorbents
- Appropriate sampler and sorbent chosen based on:
 - Contaminants of Concern
 - Duration of Sampling
 - Setting Parameters
 - Air Velocity
 - Temperature
 - Humidity
 - Physical Limitations
 - Diffusion Limitations (e.g., soil)



Passive Sampling



- Work closely with the laboratory
- Provide them with a thorough description of site conditions and data quality needs



Figure 1. Relationship of mass collected versus time for a passive sampler.

$C_{coc} = M/(UR \times t)$

Where:

 C_{coc} = time-weighted average air concentration (µg/m³)

M = mass of VOC retained by passive sampler (µg - micrograms); reported by lab

UR = uptake rate (mL/min, compoundspecific); also called "sampling rate" (device-specific)

t = sampling duration (min)

Passive Samplers: Calculating Concentration

Uptake Rate Validation



- Uptake rates validated in controlled laboratory conditions provide the most confidence
- Uptake rates can be estimated based on compound diffusion in air and sampler configuration

Experimentally validated uptake rates should be available for key risk drivers (TCE, PCE, Benzene), particularly when assessing indoor air

> TCE = trichloroethene PCE = tetrachloroethene

Sorbents – A quick reference guide

| Sorbent | | Volatilit Hydrocarbon range | y range Boiling point (°C) | Suitable analytes | Max. temp (°C) III | Desorb temp (°C) 121 |
|-----------------------------|--|---|----------------------------------|---|--------------------------|--------------------------------------|
| Porous polymer | Tenax TA | CC_10 | 100 - 450 | Aromatics, apolars, polar compounds bp >150°C, and semi-volatiles. | 350 | 300 |
| | Tenax GR | C ₆ –C ₃₀ | 100 - 450 | Aromatics, apolars, polar compounds >150°C, and semi-volatiles. | 350 | 300 |
| | HayeSep D | $C_{_{5}} - C_{_{12}}$ | 50 200 | Low molecular weight compounds, acetylene, halogens, and sulfur groups. GB/GE derivative of VX (CWA). | 290 | 280 |
| 100 | PoraPak N | C ₆ - C ₁₀ | 50 - 200 | Polar VOCs, acrylonitrile, acetonitrile, propionitrile, pyridine, volatile alcohols, ethanol, methyl ethyl ketone. | 190 | 165 |
| - 12 | PoraPak Q | $C_{5} - C_{12}$ | 50 - 200 | Orggenated compounds. | 250 | 190 |
| Graphitised carbon black | Carbograph 2TD Carbopack C Carbotrap C | C ₈ - C ₂₀ | 130 - 340 | Allyl benzenes and large aliphatics. Heavy organics: PCBs, PNAs. | 400 | 360 |
| | Carbograph 1TD Carbopack B Carbotrap B | $\mathbf{C}_{5}-\mathbf{C}_{14}$ | 50 250 | A wide range from medium to high volatility: Hetones, alcohols, and aldehydes (but not formaldehyde). Non-polars within volatility range. Perfluorocarbon tracer gases. BTX. | 400 | 360 |
| | Carbograph STD Carbopack X | $C_a - C_a$ | 50 - 150 | Especially good for 1,3-butadiene and light hydrocarbons. | 400 | 360 |
| | Carbopack Y Carbotrap Y | C ₁₂ - C ₂₀ | 50 - 340 | Less volatile hydrocarbons. Pesticides e.g. alachior atrazine, isoprene, and formothyon. | 400 | 360 |
| Carbonised molecular si | ovo Noveza | $C_3 - C_8$ | -30 - 150 | Thiols. WOCs (vinyl chloride, $\rm CS_{\rm jr}$ methanol, ethanol, and acetone). Used for sterically large VVOCs ($\rm SF_{\rm b}).$ | 400 | 360 |
| | Carbosleve S-III | $C_2 - C_5$ | -90 80 | Permanent gases, and ethene to $n\text{-}C_{\wp}$ e.g. chloromethane. Also ethylene from small volumes. | 400 | 360 |
| | Carboxen 1000 | $\mathbf{C}_{\mathrm{p}} - \mathbf{C}_{\mathrm{s}}$ | -60 80 | Permanent gases, and ultra-volatile hydrocarbons, e.g. vinyl chloride. | 400 | 360 |
| | Carboxen 1003 | $\mathbf{C}_2 - \mathbf{C}_5$ | -60 - 80 | Permanent gases, and ultra-volatile hydrocarbons, e.g. ethane. | 400 | 360 |
| Zeolite molecular si | eve Molecular Sieve 5Å | $C_2 - C_4$ | -90 - 80 | Permanent gases, and nitrous oxide | 400 | 300 (165 for N ₃ 0) |
| Other | Silica Gel | ŊΆ | N/A | Low-boiling polar compounds, especially useful for separating chlorinated or sulfur compounds from matrices with hydrocarbon interferences. | 200 | 180 |
| | Quartz wool | N/A | N/A | SVOCs. | 400 | 360 |

 Maximum temperature should not be exceeded, to prevent irreversible damage to sorbent. When using multi-beds of sorbents, maximum temperature is the lowest of all sorbents within the tube.

[2] Recommended desorption temperatures are a guide and may require optimisation depending on target analytes. Lower desorption temperatures are recommended where possible to prolong sorbent lifetime. Sorbert conditioning

should be carried out at 10-20°C above the desorption temperature.



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$t = (M_{min})/(UR \times RL)$

Where:

t = duration of sampling (min)

Calculating Duration to Achieve a Reporting Level

M_{min} = laboratory reporting limit for each individual VOC (μg)

UR = the compound-specific uptake rate

(mL/min)

RL = minimum reporting levels ($\mu g/m^3$)

Passive Samplers: Placement Considerations

Sampling Goal

Breathing Zone (Occupant Interference)

Source and Pathways

Workplace Setting & Variable Conditions

Humidity

Air Movement

Temperature

Non-target compounds

Concentration Range

Sampling Goal – Breathing Zone



- Elevation
 - 3-5' adults
 - Lower childcare
- Mounting
- Interference
 - Adults
 - Children
 - Pets

Sampling Goal – Sources and Pathway Assessment



Workplace Settings & Variable Conditions







Considerations:

- Occupancy levels
- HVAC management

Is the **uptake rate** in the sampled setting the same as that calculated in the laboratory during validation for your sampler?





Air Movement

(Face Velocity)

Too Low

- Sampler "starvation"
- Low-biased concentration
- Avoid closets, inside shelves, near walls
- Enhance air movement
- Some samplers less susceptible

Too High

- Advective flow
- High-biased concentration
- Avoid vents, windows, exhaust fans
- Some samplers less susceptible

Optionally check with an anemometer

Humidity



Choose appropriate sampler for high humidity settings (i.e., wet basement, sump, conduit, sub-slab, soil):

- Hydrophobic sorbent
- Passive permeation membrane sampler

Temperature



Avoid

- Direct sunlight
- Outside walls
- Heaters
- Lighting fixtures
- Air conditioners



Non-Target Compounds













Outdoor Air

- Determine the target contaminants of concern (COCs).
- Determine the target or available sampling duration.
 - Is the period shorter to obtain results more quickly or longer to better account for temporal variability?
 - \circ Is there a practical time limit due to occupant access, permits, etc.?

Determine the reporting limit. In some cases, passive samplers can be used qualitatively to determine where concentrations are higher, for example, finding a hot spot beneath a parking lot. Such applications allow more flexibility in reporting results. Whenever samplers are used to determine whether contaminant concentrations are below a Vapor Risk Screening Level (VRSL) or Vapor Action Level (VAL) (refer to the January 2018 RR-800) at a location for the purpose of evaluating risk to building occupants, reporting limits for the COC should conform to the following:

- Indoor Air: Below the VAL for all samples*. Longer duration samples should have reporting levels at least equivalent to those typically achieved by canister samples.
- Sub-slab: Below the sub-slab VRSL for all samples*. Longer duration samples should have reporting levels at least equivalent to those typically achieved by canister samples.

Determine the reporting limit continued...

 Note: Sampling events performed to quickly evaluate indoor air and sub-slab concentrations are typically conducted over durations of less than 24 hours. If passive samplers are used during such an event, the shorter duration will result in higher achievable reporting limits. The use of a passive sampler is still appropriate (and may be preferred if sampling can be performed more quickly due to canister availability limitations) if the VALs and VRSLs can be achieved. Also, passive samplers will not be able to achieve a reporting limit below the VAL for vinyl chloride over short durations such as 24 hours but should over longer duration events.

 \circ Conduits:

- For conduits that enter a building, at locations outside the building, below the Sanitary Sewer Gas Screening Level (SSGSL) (refer to RR-649).
- For conduits within a building, below the VAL.
- $\,\circ\,$ Soil Gas: Below the shallow soil gas VRSL.

- Determine expected sampling conditions, for example: humidity, air flow, temperature, anticipated concentration range, presence of non-target compounds, occupant expectations, placement limitations, and the need to account for HVAC setbacks or occupancy levels.
- Consult with the laboratory to select the appropriate sampler and sorbent for the target COCs, setting, anticipated concentrations, and expected sampling duration that can achieve the target reporting limits. For critical contaminant risk drivers (i.e., TCE, PCE, Benzene but others as determined by site specific conditions), choose samplers that have uptake rates experimentally validated for the COC and the duration of the sampling event.

Implement the Sampling Program.

- \circ Follow all sampler-specific procedures.
- Utilize appropriate number of field quality control samples recommended by the lab.
- \circ Record the sampling start and stop dates and times to the minute.
- Document the sampler placement using a description, sketch, or photograph.
- Document the sampling location conditions including temperature, humidity, and air flow. For locations where these parameters do not vary substantially, such as most residences, these can be measured at the start and end of sampling. Where conditions may be highly variable in a setting, devices that record this information during the sampling period could be used.

Implement the Sampling Program continued...

- Collect inter-method samples, such as air canister samples, to assist in evaluating passive sampler accuracy if site conditions are likely to result in the uptake rate to deviate substantially from published values and concentrations cannot be corrected by the lab using other data collected (such as temperature).
- Provide documentation of the following: sampler manufacturer, sorbent type, extraction and analytical method, reporting limit, estimated concentrations, identify concentrations corrected by the lab (such as for temperature), air volume sampled, laboratory certifications or accreditations, QA/QC procedures, and sampling conditions as described above.

Passive Sampling



Work closely with the laboratory

Provide them with a thorough description of site conditions and data quality needs

Passive Samplers in Settings other than Indoor Air



Reference Pertinent to Passive Sorbent Sampling

- American Society for Testing and Materials (ASTEM) Subcommittee: D22.05. "Standard Guide for Placement and Use of Diffusive Samplers for Gaseous Pollutants in Indoor Air." In ASTM Book of Standards Volume: 11.07, ASTM D6306-17. West Conshohocken, PA : ASTM International, 2017.
- Department of Defense. "Passive Sampling for Vapor Intrusion Assessment." In DOD Vapor Intrusion Handbook, Fact Sheet Update No: 001, Revision 1. 2009.
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- Gross, D. and J. McKernan. Passive Samplers for Investigations of Air Quality: Method Description, Implementation, and Comparison to Alternative Sampling Methods [EPA/600/R-14/434]. Washington, DC: U.S. Environmental Protection Agency, 2014.
- McAlary, T. Development of Most Cost-Effective Methods for Long-Term Monitoring of Soil Intrusion to Indoor Air Using Quantitative Passive Diffusive-Adsorptive Sampling: ESTCP Project ER-200830. ON, Canada: Geosyntec Consultants, Inc., 2014.
- McAlary, T, Groenevelt, H., Disher, S., Arnold, J., Seethapathy, S., Sacco, P., and T. Gorecki. "Passive Sampling for Volatile Organic Compounds in Indoor Air-Controlled Laboratory Comparison of Four Sampler Types." *Environmental Science: Processes* & Impacts 17, no. 5: 896-905.

Additional References

Wisconsin Department of Natural Resources. *Guidance for Documenting the Investigation of Human-made Preferential Pathways Including Utility Corridors* [RR-649]. Remediation and Redevelopment Program, 2021.

Wisconsin Department of Natural Resources. Addressing Vapor Intrusion at Remediation & Redevelopment Sites in Wisconsin [RR-800]. Remediation and Redevelopment Program, 2018.

https://www.assaytech.com/

https://beacon-usa.com/

https://www.eurofinsus.com/environmenttesting/services/air-and-vapor/vapor-intrusion/

https://www.pacelabs.com/

https://radiello.com/

https://www.siremlab.com/waterloo-membranesampler-wms/

https://www.skcinc.com/

Sampler Vendors & Labs

Site-specific Questions Contact the DNR Project Manager

CONNECT WITH US

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