

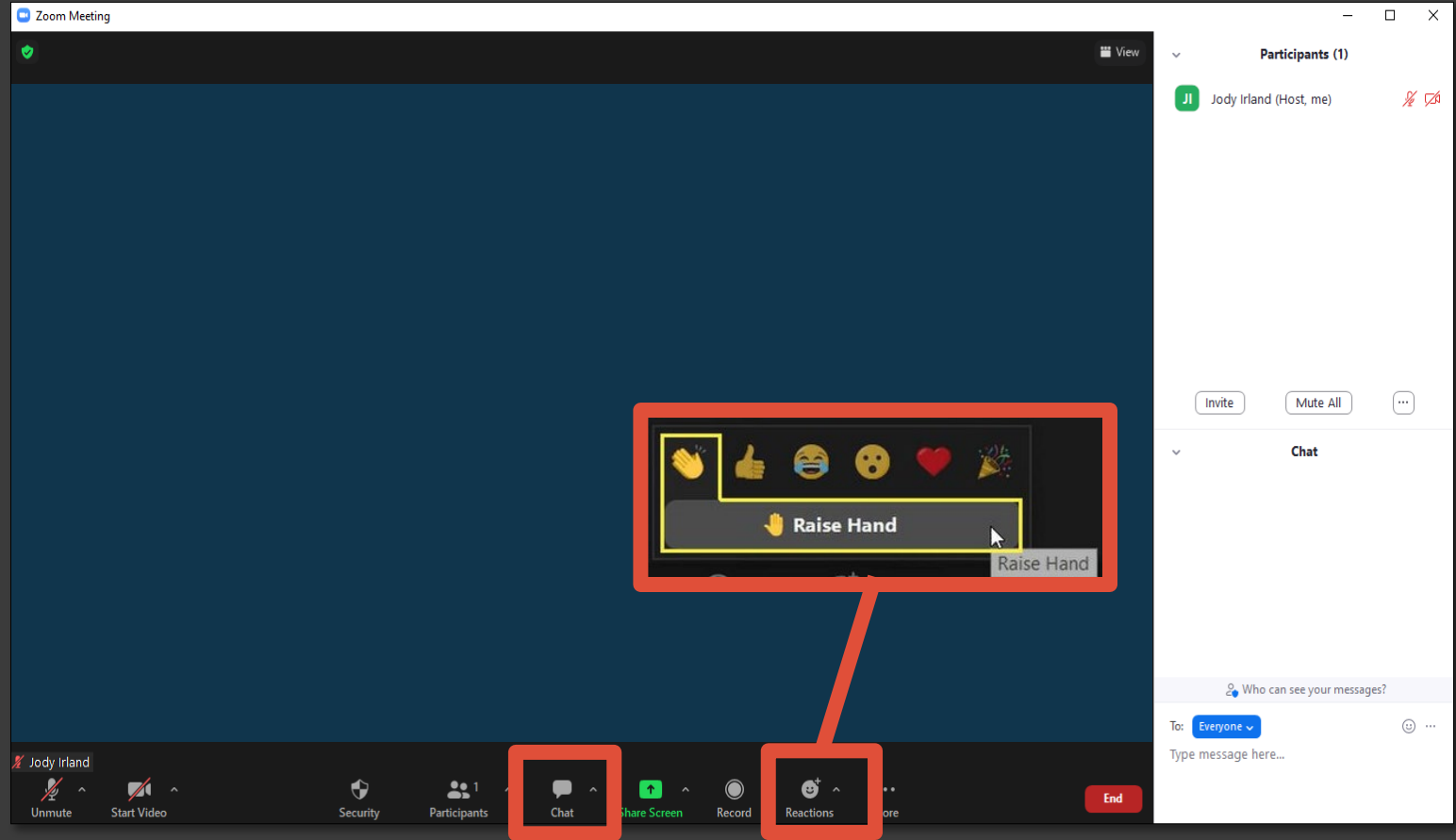


# Issues & Trends

Vapor Intrusion in Wisconsin  
2023 Updates

# Zoom Logistics

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



Today's recording will be available at [dnr.wi.gov](https://dnr.wi.gov), search "RR Training Library"

# RR Program Announcements

**Congrats, Matt Thompson!**

Accepted a new position as the Team Supervisor in the West Central Region (WCR) stationed in the Eau Claire office.



# Public Input Opportunities

## Coming Soon

- *Guidance: Tips and Reminders for a Complete Closure Submittal (RR-979)*
- *Addressing Vapor Intrusion at Remediation and Redevelopment Sites in Wisconsin (RR-800)*

Wisconsin DNR – Vapor Intrusion and Dry Cleaners

Remediation and Redevelopment Program March 2023

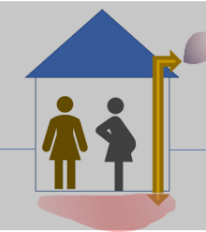
Addressing Vapor Intrusion at Remediation and Redevelopment Sites in Wisconsin

Wis. Stat. ch. 292, Wis. Admin. Code chs. NR 700-799

**Purpose**  
This guidance is for persons who perform investigation and remediation of sites with environmental contamination under Wisconsin Administrative Code (Wis. Admin. Code) chs. NR 700-799 and Wisconsin Statute (Wis. Stat.) ch. 292. Specifically, this guidance is intended for responsible parties, property owners, environmental consultants, and attorneys who involved with the investigation, remediation, or mitigation of vapor contamination.

This guidance applies to sites with volatilized subsurface contaminants (i.e., vapors) that have migrated to or have the potential to migrate to occupied buildings or buildings may become occupied.

This guidance identifies conditions that indicate an assessment of the vapor intrusion pathway is necessary at contaminated sites. It recommends guidelines 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.



**Related Guidance**  
Wisconsin Department of Natural Resources (DNR) publications and forms referenced in this document include a number beginning with "RR-" or "4400-". Locate these publications and forms by visiting [dnr.wi.gov](http://dnr.wi.gov) and search for the number.

Find additional information at [dnr.wi.gov](http://dnr.wi.gov)

Publication: RR-800  
This document is intended solely as guidance and does not contain any mandatory requirements. It is intended to assist in administrative rule-making. Any regulatory decisions made in any matter addressed by this guidance will be made by applying the governing statutes and administrative codes to the relevant facts.

Wisconsin DNR – NR 700 Process

Remediation and Redevelopment May 2023

Guidance: Tips and reminders for a complete closure submittal

This document includes reminders and tips for a correct and complete closure submittal under Wisconsin Administrative (Wis. Admin.) Code ch. NR 726. This document is a supplement to Form 4400-202, *Case Closure*, and Wis. Admin. Code ch. NR 726, and in no way should be used independently for completing a case closure request. If you have questions on a specific case, please contact your assigned project manager.

This document is intended solely as guidance and does not contain any mandatory requirements except where requirements are found in statute or administrative code as referenced. Any regulatory decisions made by the DNR in any matter addressed by this guidance will be made by applying the governing statutes and administrative codes to the relevant facts.

DNR forms referenced in this document include a number beginning with "4400." To locate these forms, visit [dnr.wi.gov](http://dnr.wi.gov) and search for the form number. Visit the RR program [Publications and Forms](http://dnr.wi.gov) web page for instructions and helpful hints using DNR PDF fillable forms. This guidance document replaces previous DNR publications *Improve Your Closure Request: Maintenance Plans & Maps* (RR-983) and *DNR Frequently Asked Questions (FAQs): Administrative Completeness Review at Closure*, ch. NR 726 (RR-975).

General Information	
<input type="checkbox"/>	<b>Required</b> <b>Form 4400-202, Case Closure</b> Use of 4400-202 is required under Wis. Admin. Code § NR 726.09(1). If you have any questions on what is required for a certain section, contact your assigned DNR project manager. This form is subject to periodic updates; make sure you are using the most current version by searching "4400-202" on the DNR website. Do not use a version saved on your desktop.
<input type="checkbox"/>	<b>Encouraged</b> <b>Document Submittal</b> In 2020, DNR temporarily suspended the requirement to submit hard copies of case closure requests. Customers are strongly encouraged to submit a complete electronic closure request packet via the RR Submittal Portal ( <a href="https://dnr.wi.gov/topic/Brownfields-Submittal.html">https://dnr.wi.gov/topic/Brownfields-Submittal.html</a> ). For additional submittal instructions, please review RR-690, <i>Guidance for Electronic Submittal for the Remediation and Redevelopment Program</i> . Visit <a href="http://dnr.wi.gov">dnr.wi.gov</a> , search "RR-690."  Revisions to closure materials should be submitted per the guidance in RR-690. Only revised pages with the date and consultant's initials are required. Resubmitting an entire closure request packet when revisions are requested to specific items is discouraged.
<input type="checkbox"/>	<b>Required</b> <b>Fees</b> Appropriate fees under Wis. Admin. Code ch. NR 749 must be submitted with the case closure request per Wis. Admin. Code § NR 726.05(1). This includes both the review fee and applicable database fees. The DNR accepts checks and electronic payments for fees. More information on RR Program services and fees is available online <a href="http://RR.ServicesandFees">RR Services and Fees</a> website. Visit <a href="http://dnr.wi.gov">dnr.wi.gov</a> , search "RR Fees." Additional instructions

Publication: RR-979  
dnr.wi.gov Search: "closure submittal"

# Public Input Opportunities

## Coming Soon

- *Guidance: Mechanical and Chemical/Biological Spill Response Methods (RR-710)*
- *DNR Staff Provide Spill Response and Support (RR-559)*
- *Immediate Reporting Required for Hazardous Substance Spills (RR-560)*



# Public Input Opportunities

The screenshot shows the Wisconsin Department of Natural Resources website. The header includes social media icons and a search bar. The main navigation menu lists: HUNTING, FISHING, PARKS, CLIMATE, ENVIRONMENT, FORESTRY, LICENSES, NEWS, ABOUT, CONTACT. The breadcrumb trail is: » TOPIC » BROWNFIELDS: REDEVELOPMENT OPPORTUNITIES. The main heading is **REMEDIATION & REDEVELOPMENT PROGRAM PUBLIC NOTICES**. Below this, text states: "Remediation & Redevelopment (RR) Program public notices and public comment opportunities are listed below." It provides links for "External advisory group meeting information" and "Find trainings and presentations offered by the RR Program". A tabbed interface shows "Public Notices" selected. The "PROGRAM GUIDANCE" section explains that the RR Program welcomes input and provides a table of guidance in development or under active review. A sidebar on the right lists "Brownfields: Redevelopment Opportunities" with links for: RR Report Newsfeed, Find Contaminated Land Activities, Request Green Team Assistance, Submit Files Related to ch. NR 700, Wis. Adm. Code, Report a Spill, and Environmental Contamination & Cleanup. A "Related Links" section includes "For Environmental Professionals".



[dnr.wisconsin.gov/topic/brownfields/publicnotices.html](https://dnr.wisconsin.gov/topic/brownfields/publicnotices.html)

# Remediation and Redevelopment External Advisory Group

- **Subgroup Series** – Dec. 5, 2023
- **RR EAG** - January 25, 2024
- **Subgroup Series** – Feb. 28
- **RR EAG** - April 11, 2024
- **Subgroup Series** – May 29
- **RR EAG** - July 25, 2024 (tentative)



**Sign up for Updates**

[dnr.wisconsin.gov/topic/brownfields/rreag](https://dnr.wisconsin.gov/topic/brownfields/rreag)





# Brownfields Funding Resources



**Gena Larson**

Gena.Larson@wisconsin.gov

## WAM Contractor Services (DNR-managed)

- Up to ~ \$54,000 in services per property
- DNR hires contractor & oversees work

## WAM Community-managed

- Up to \$100,000 grant to local government
- Local government selects contractor & oversees work

## Ready for Reuse

- 0% interest loan, 22% match requirement
- Up to 30% loan forgiveness



# ISSUES & TRENDS



Today's recording will be available at [dnr.wi.gov](http://dnr.wi.gov), search "**RR Training Library**"

Subscribe to **RR Report Newsfeed** for Email Notifications



[dnr.wisconsin.gov/topic/Brownfields/News.html](http://dnr.wisconsin.gov/topic/Brownfields/News.html)



## Jennifer Borski

Dry Cleaning and Vapor Intrusion Team Leader



# Agenda

- Vapor Mitigation Systems: Active Alarms, Telemetry & Backup Power
- New Vapor Intrusion Resources
- RR External Advisory Group Vapor Intrusion Subgroup
- Technical Updates on Passive Sampling, Sewers, Cracks and other Pathways – Jim Walden





# **Vapor Mitigation Systems**

## **Active Alarms, Telemetry & Backup Power**

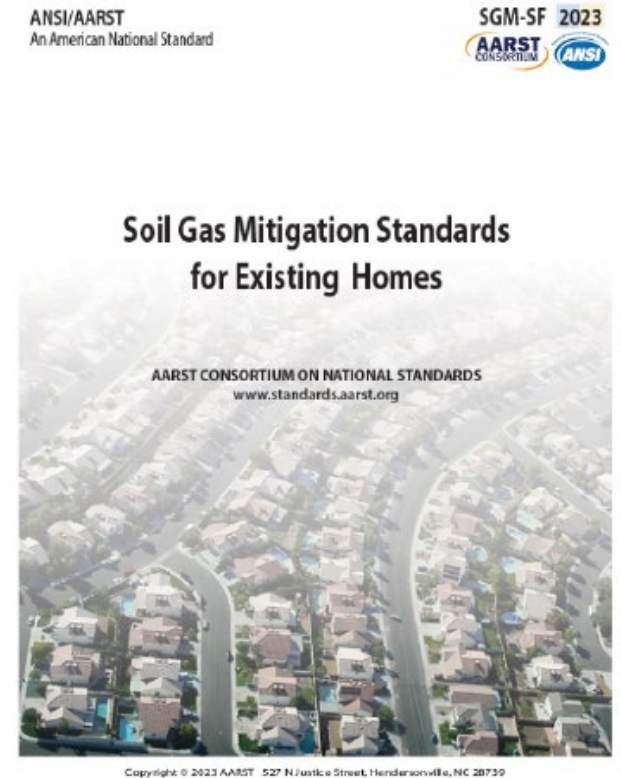
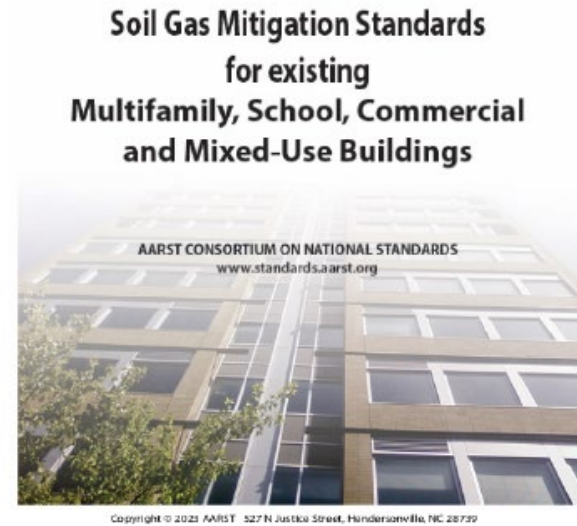
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# Vapor Mitigation Systems

## Active Alarms, Telemetry & Backup Power

### Active Notification Options

- Audible notification that is clear and distinct
- Visual light notification that is vividly observable
- Notification by telemetric means such as by email or other electronic communication

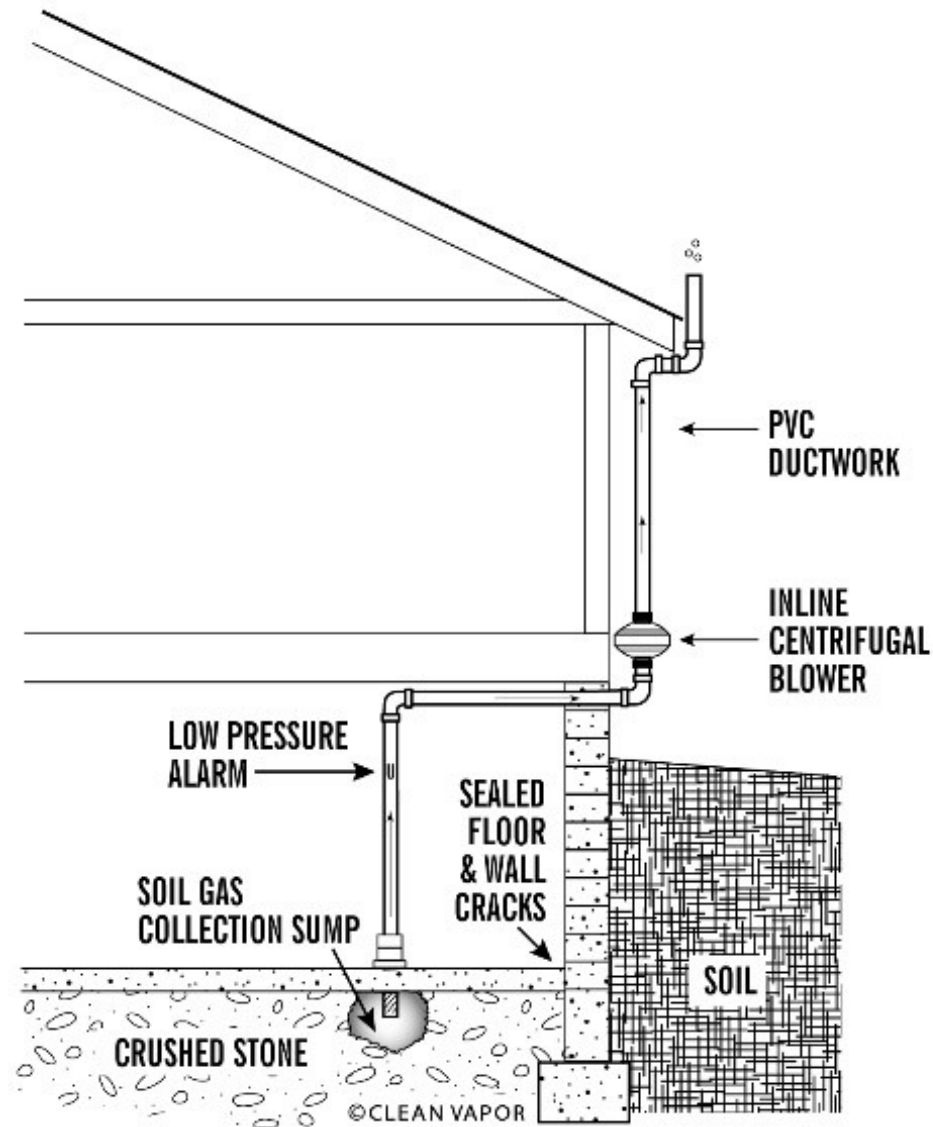




# Vapor Mitigation Systems

## Active Alarms, Telemetry & Backup Power

### Sub-Slab Depressurization System



<https://vim-1.itrcweb.org/>



# Vapor Mitigation Systems

## Active Alarms, Telemetry & Backup Power





# Vapor Mitigation Systems

## Active Alarms, Telemetry & Backup Power

DNR may determine the frequency with which a VMS must be monitored, which could be “**frequent**” or “**continuous monitoring**” of system components to assure protectiveness.

(Wis. Admin. Code § NR 724.13(1)(d))



# Vapor Mitigation Systems

## Active Alarms, Telemetry & Backup Power

DNR recommendations to meet this requirement where there is a **risk to public health** using current technology:

- a. Active notification (audible, visual or telemetry) for all active VMSs; and
- b. Telemetry and backup power where both are present:
  - i. Multi-family residential building (or site-specific conditions warrant); and
  - ii. Acute risk levels detected prior to mitigation in indoor air or sub-slab vapor

DNR will monitor technology and health risk with Department of Health Services (DHS) and provide modified recommendations when appropriate.



# Vapor Mitigation Systems

## Active Alarms, Telemetry & Backup Power

### Acute Risk

- Trichloroethene (TCE) above vapor action level (VAL) in indoor air
- TCE above the vapor risk screening level (VRSL) in sub-slab vapor
- Non-carcinogen above three times the VAL or VRSL
- Carcinogen above ten times the VAL or VRSL

Use Guidance: *Wisconsin Vapor Quick Look-Up Table*

*Indoor Air Vapor Action Levels and Vapor Risk Screening Levels (RR-0136)* to determine non-carcinogen vs. carcinogen for inhalation pathway

Go to [dnr.wi.gov](http://dnr.wi.gov), search “RR-0136”



# Guidance: Wisconsin Vapor Quick Look-Up Table <sup>1, 2, 3</sup> Indoor Air Vapor Action Levels and Vapor Risk Screening Levels

(Based on **May 2023** U.S. Environmental Protection Agency (U.S. EPA) Regional Screening Levels)



## Remediation and Redevelopment Program

August 2023

CHEMICAL	RESIDENTIAL				SMALL COMMERCIAL				LARGE COMMERCIAL/INDUSTRIAL				MOLECULAR WEIGHT	U.S.EPA RSL BASIS				
	AF = 0.03								AF = 0.01									
	INDOOR AIR VAL		SUB-SLAB VAPOR VRSL		INDOOR AIR VAL		SUB-SLAB VAPOR VRSL		INDOOR AIR VAL		SUB-SLAB VAPOR VRSL							
	µg/m <sup>3</sup>	ppbV	µg/m <sup>3</sup>	ppbV	µg/m <sup>3</sup>	ppbV	µg/m <sup>3</sup>	ppbV	µg/m <sup>3</sup>	ppbV	µg/m <sup>3</sup>	ppbV	g/mole					
Benzene	3.6	1.1	120	37	16	4.9	520	160	16	4.9	1,600	490	78.11	c				
Carbon Tetrachloride	4.7	0.73	160	25	20	3.1	680	110	20	3.1	2,000	310	153.82	c				
Chloroform	1.2	0.24	41	8.3	5.3	1.1	180	36	5.3	1.1	530	110	119.38	c				
Chloromethane	94	45	3,100	1,500	390	190	13,000	6,200	390	190	39,000	19,000	50.49	n				
Dichlorodifluoromethane	100	20	3,500	700	440	88	15,000	3,000	440	88	44,000	8,800	120.91	n				
1,1-Dichloroethane (1,1-DCA)	18	4.4	590	140	77	19	2,600	630	77	19	7,700	1,900	98.96	c				
1,2-Dichloroethane (1,2-DCA)	1.1	0.27	36	8.7	4.7	1.1	160	39	4.7	1.1	470	110	98.96	c				
1,1-Dichloroethylene (1,1-DCE)	210	52	7,000	1,700	880	220	29,000	7,200	880	220	88,000	22,000	96.94	n				
Dichloroethylene, cis-1,2-	42	10	1,400	350	180	45	5,800	1,400	180	45	18,000	4,500	96.94	n				
Dichloroethylene, trans-1,2-	42	10	1,400	350	180	45	5,800	1,400	180	45	18,000	4,500	96.94	n				
Ethylbenzene	11	2.5	370	84	49	11	1,600	360	49	11	4,900	1,100	106.17	c				
Methylene Chloride	630	180	21,000	5,900	2,600	740	88,000	25,000	2,600	740	260,000	74,000	84.93	n				
Naphthalene	0.83	0.16	28	5.3	3.6	0.68	120	23	3.6	0.68	360	68	128.18	c				
Tetrachloroethylene (PCE)	42	6.1	1,400	200	180	26	5,800	840	180	26	18,000	2,600	165.83	n				
1,1,1-Trichloroethane (1,1,1-TCA)	5,200	940	170,000	31,000	22,000	4,000	730,000	130,000	22,000	4,000	2,200,000	400,000	133.41	n				
Trichloroethylene (TCE)	2.1	0.38	70	13	8.8	1.6	290	53	8.8	1.6	880	160	131.39	n				
Trichlorofluoromethane	--	--	--	--	--	--	--	--	--	--	--	--	137.37	--				
Vinyl Chloride	1.7	0.65	56	22	28	11	930	360	28	11	2,800	1,100	62.50	c				
Xylene (mix)	100	23	3,500	790	440	100	15,000	3,400	440	100	44,000	10,000	106.17	n				

### Notes

All values in µg/m<sup>3</sup> obtained from U.S. EPA Vapor Intrusion Screening Level (VISL) calculator (three significant figures) & rounded to two significant figures.

VISL linked to U.S. EPA RSL database of toxicity and chemical parameters.

All values in ppbV calculated from VALs & VRSLs reported above in µg/m<sup>3</sup>.

**Bolded values** are updated from previous version of WI Vapor Quick Look-Up Table.





-- = Inhalation toxicity values not available from U.S. EPA

AF = Attenuation Factor VAL = Vapor Action Level VRSL = Vapor Risk Screening Level U.S. EPA RSL = Regional Screening Level n = noncancer; c = carcinogenic

**Immediate Action Criteria: carcinogens (c) = 10 x VAL or VRSL; non-carcinogens (n) = 3 x VAL or VRSL; TCE in indoor air at certain concentrations**

# Vapor Mitigation Systems

## Active Alarms, Telemetry & Backup Power

Source property commercial with benzene > VRSL (chronic risk; passive mitigation)		<b>No active notification</b>
Restaurant with PCE > VRSL in sub-slab vapor (chronic risk; active mitigation)		<b>Active notification</b>
Single-family (SF) residence with PCE > 3x VRSL in sub-slab vapor (SF; acute risk; active mitigation)		<b>Active notification</b>
Multi-family (MF) residential with TCE > VAL in indoor air or TCE > VRSL in sub-slab vapor (MF; acute risk; active mitigation)		<b>Telemetry Backup power</b>

# Vapor Mitigation Systems

## Active Alarms, Telemetry & Backup Power

### Next Steps

- Revisions to *Addressing Vapor Intrusion at Remediation & Redevelopment Sites in Wisconsin (RR-800)*
- Developing a fact sheet on alarms and telemetry
- Consultants' Day – Coming to a region near you in 2024!





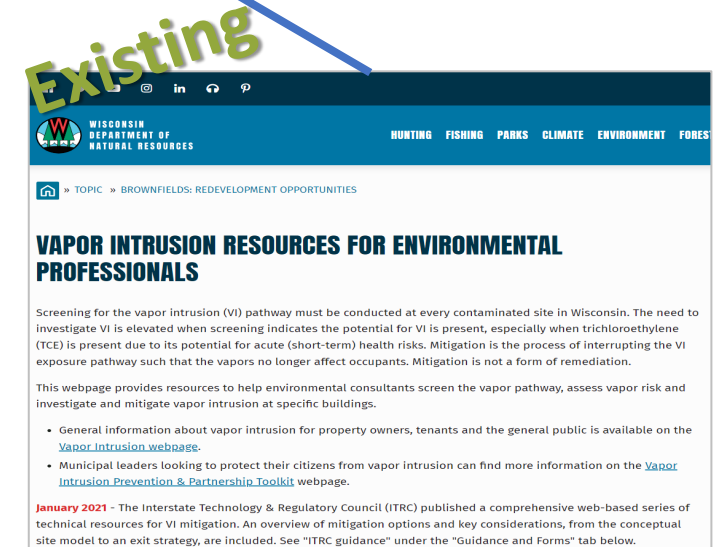
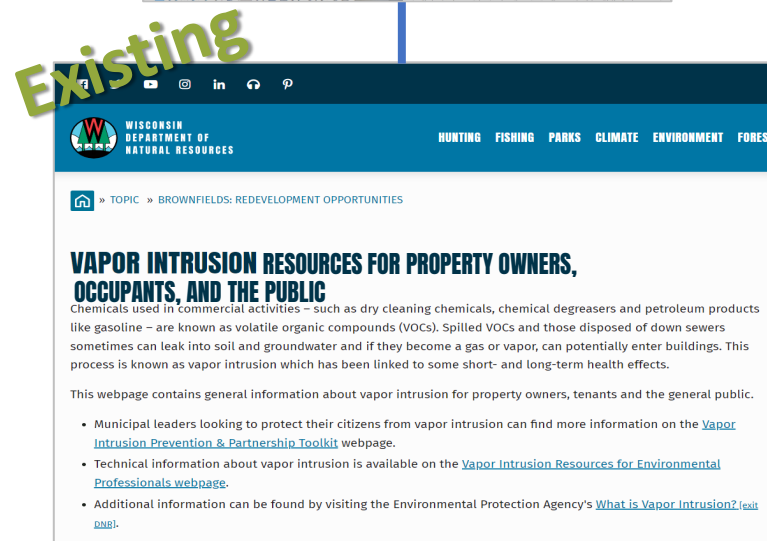
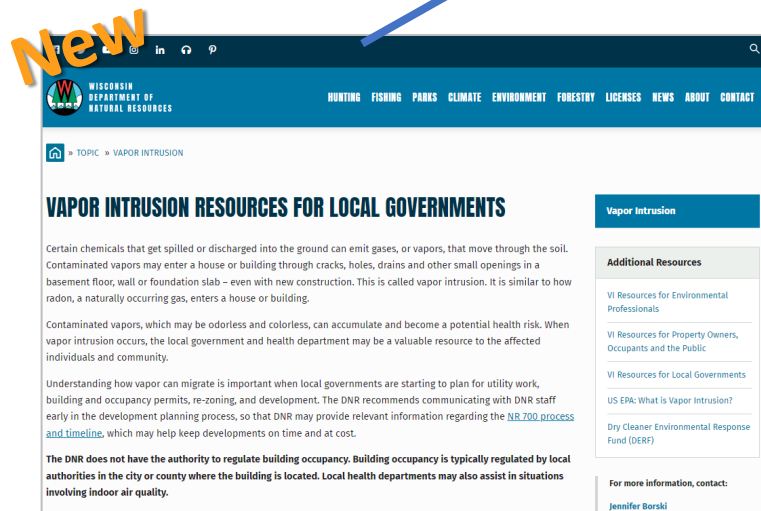
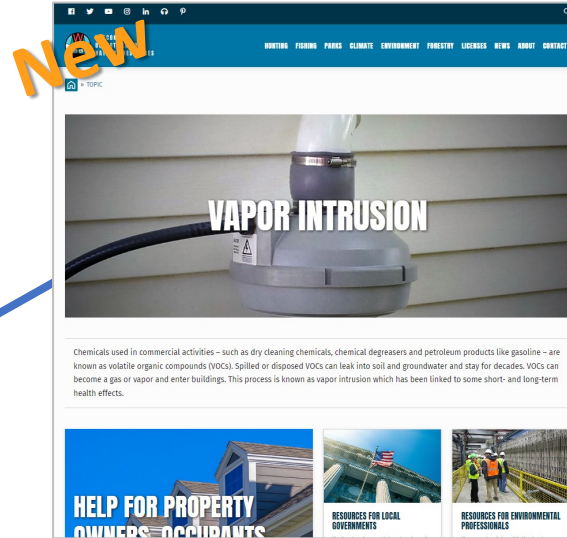
# New Vapor Intrusion Resources

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# New Vapor Intrusion Resources

[dnr.wisconsin.gov/topic/Vapor/](https://dnr.wisconsin.gov/topic/Vapor/)



# New Vapor Intrusion Resources

## Resources for Local Governments

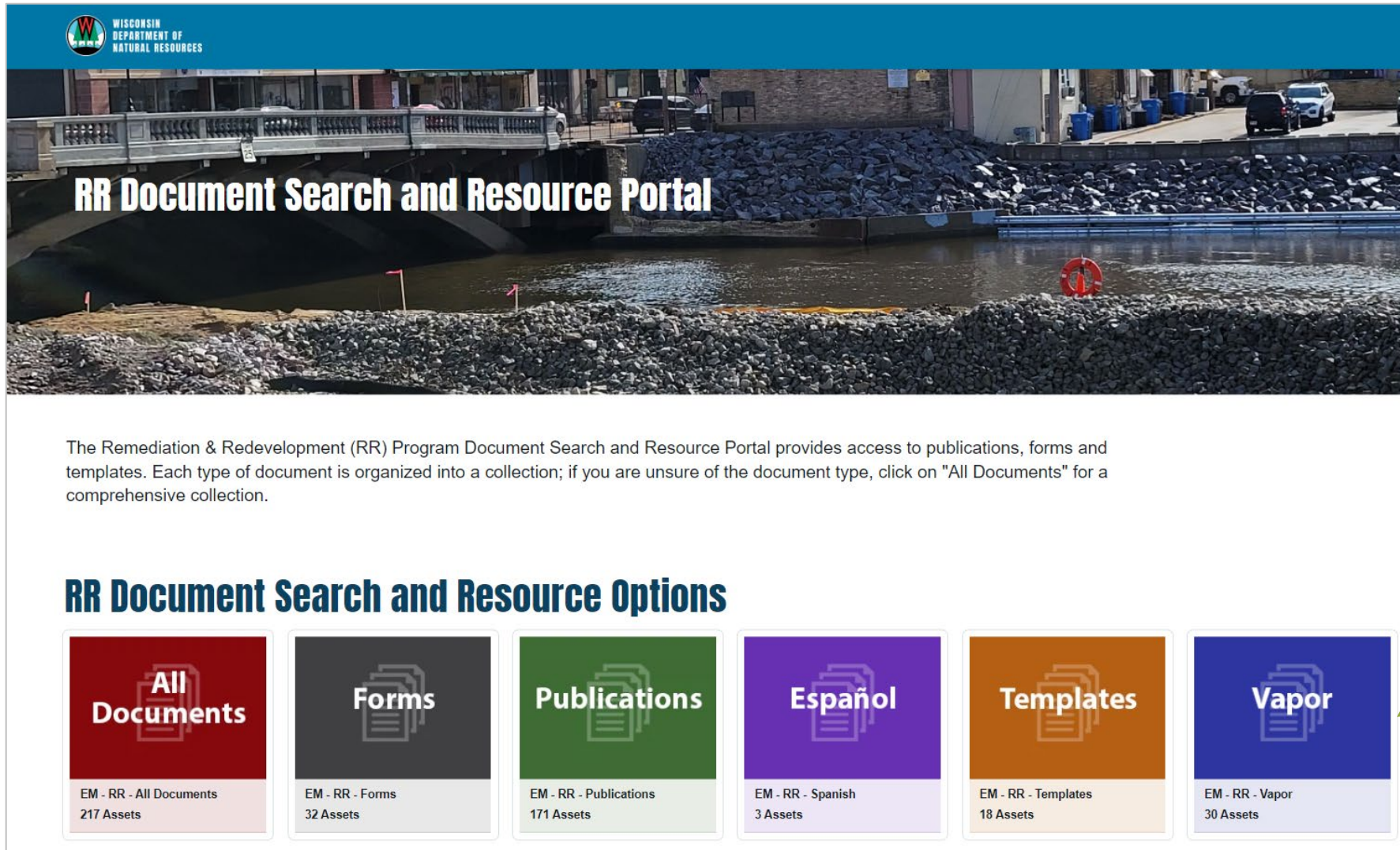
- VI overview
- Occupancy authority
- VI contacts
- Vapor Toolkit
- Vapor sources
- Investigation
- Mitigation
- Health



<https://dnr.wisconsin.gov/topic/Vapor/LocalGovtResources.html>



# New Vapor Intrusion Resources



The screenshot shows the Wisconsin Department of Natural Resources website. At the top left is the logo and text: "WISCONSIN DEPARTMENT OF NATURAL RESOURCES". Below this is a banner image of a bridge over a river with the text "RR Document Search and Resource Portal". Underneath the banner is a paragraph of text. Below the text is a section titled "RR Document Search and Resource Options" with a grid of six colored buttons. A green arrow points to the "Vapor" button.

The Remediation & Redevelopment (RR) Program Document Search and Resource Portal provides access to publications, forms and templates. Each type of document is organized into a collection; if you are unsure of the document type, click on "All Documents" for a comprehensive collection.

### RR Document Search and Resource Options

Category	Assets
All Documents	217 Assets
Forms	32 Assets
Publications	171 Assets
Español	3 Assets
Templates	18 Assets
Vapor	30 Assets



# **RR External Advisory Group Vapor Intrusion Subgroup**

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# RR EAG – VI Subgroup

## Next meeting

- Dec. 5, 2023, from 2:00 – 3:30 p.m.
- Attendance in person in Milwaukee or online

## Tentative Agenda

- Review of draft work plan
- Prioritization of objectives
- Discussion on next steps for priorities







**Jim Walden**

Vapor Intrusion Technical Expert





# Vapor Intrusion in Wisconsin

## Technical Updates: Passive Sampling, Sewers, Cracks and other Pathways



Jim Walden





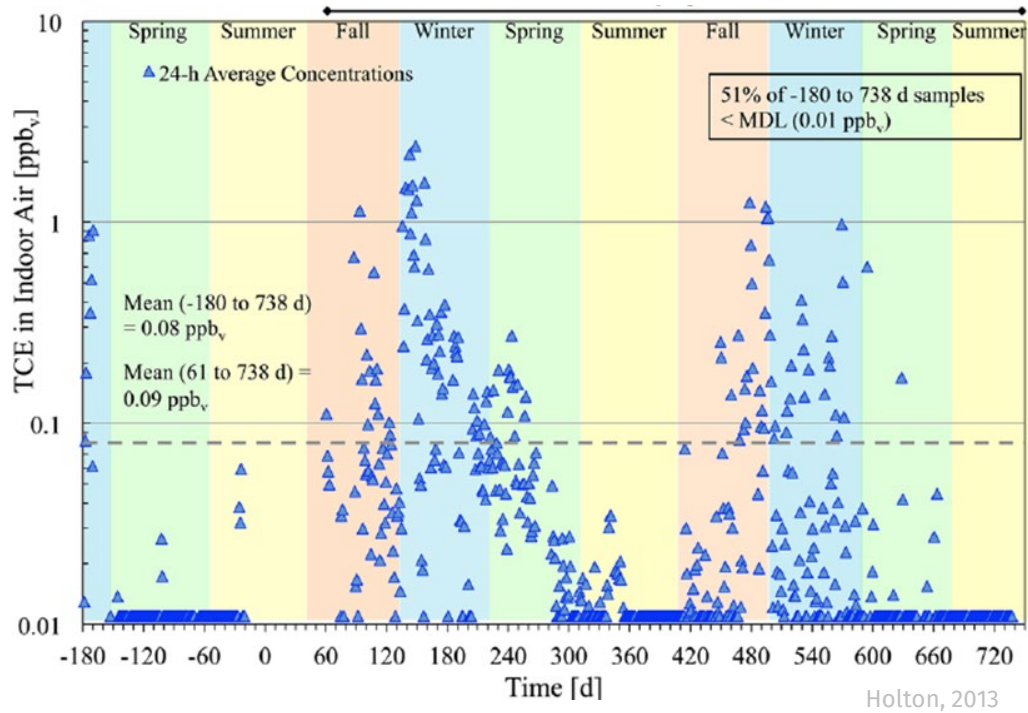
# Agenda

- Variability
- Passive Sorbent Sampling
- Conduit Vapor Intrusion (VI)
- Preferential Pathways (other than conduits)
- Real Time Tools
- New and Renovated Buildings in Contaminated Settings
- Rapid Response Mitigation (RRM)
- State Funded Vapor Investigations
- Q&A

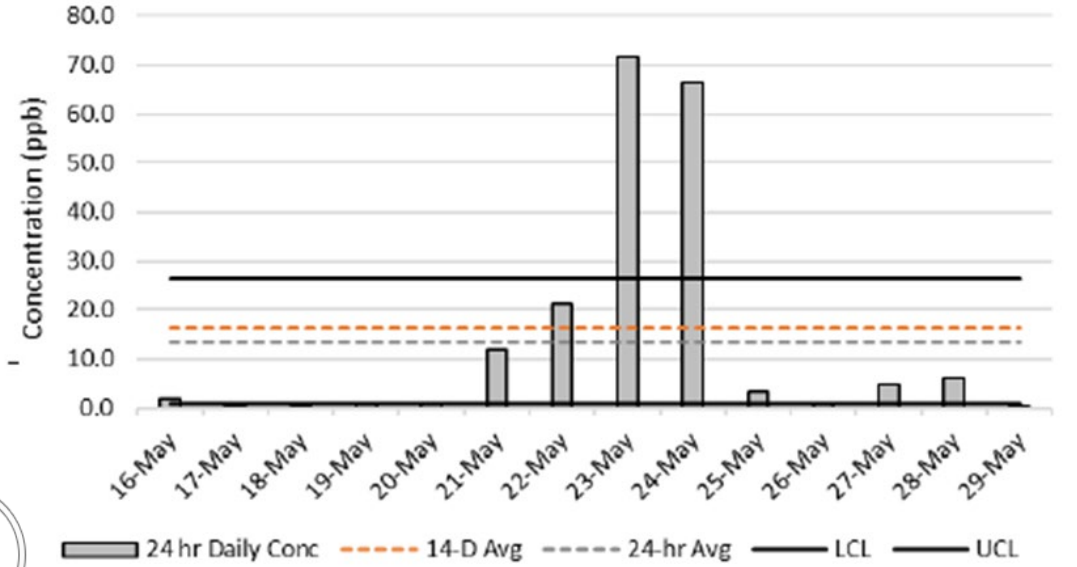


# Variability





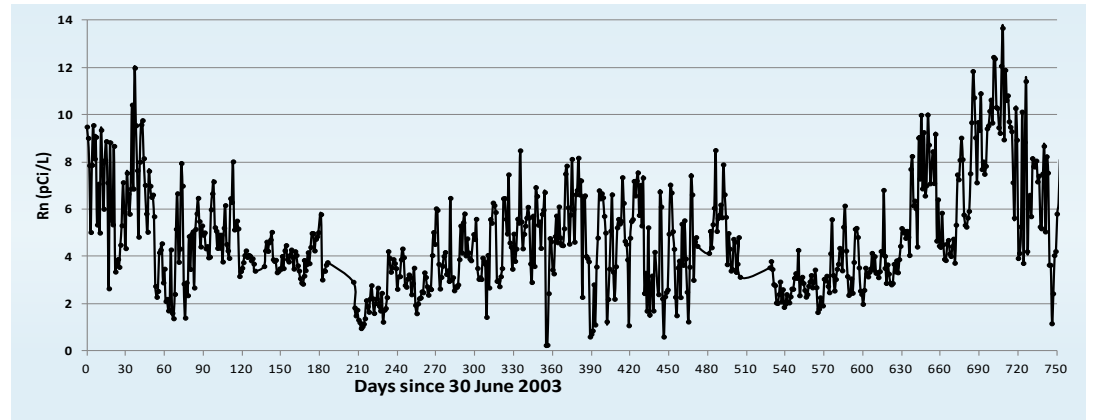
TCE Data Shed 6 Lunch Room (May 2017)



Rossner, 2020

# Indoor Air Variability

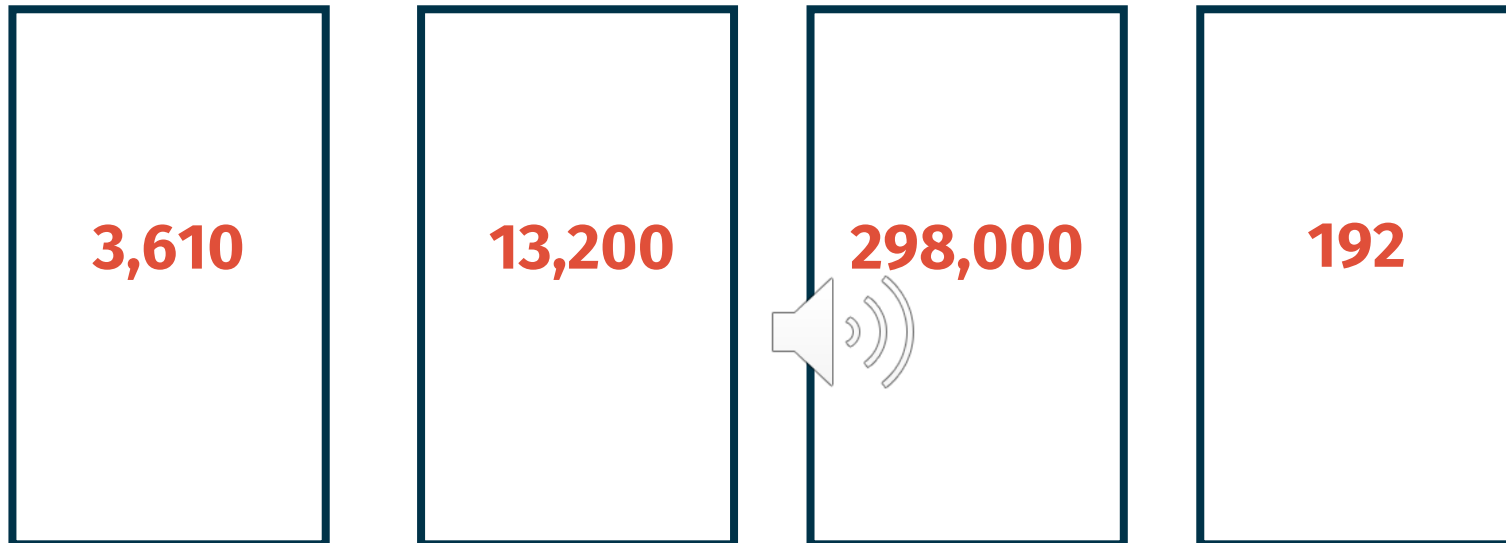
TCE = Trichloroethene (aka trichloroethylene)



Steck, 2011

# Sub-slab TCE Vapor Concentrations ( $\mu\text{g}/\text{m}^3$ )

Residential Homes Investigated in Wisconsin



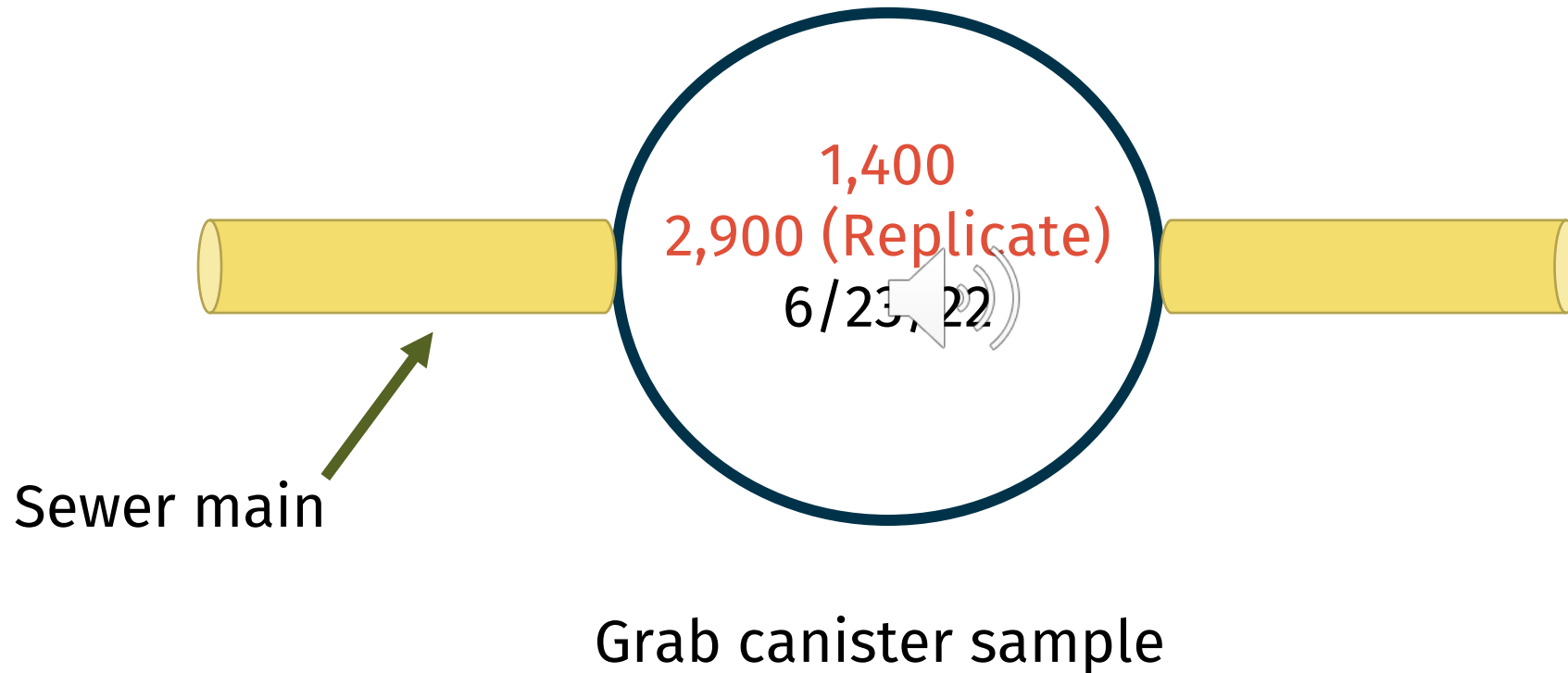
← ~200 feet →

$\mu\text{g}/\text{m}^3$  = micrograms per cubic meter

30-minute canister samples

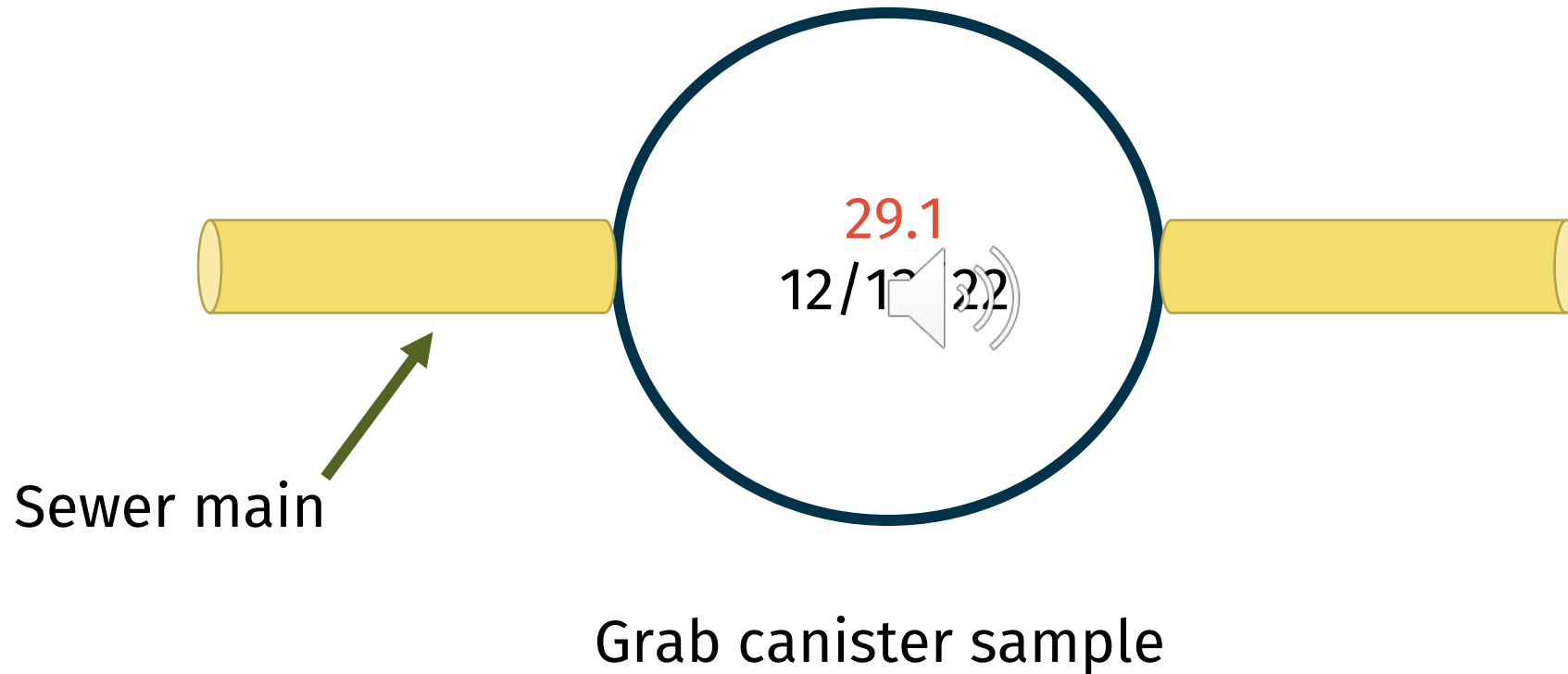
# Manhole TCE Vapor Concentrations ( $\mu\text{g}/\text{m}^3$ )

Site 1, Manhole 1



# Manhole TCE Vapor Concentrations ( $\mu\text{g}/\text{m}^3$ )

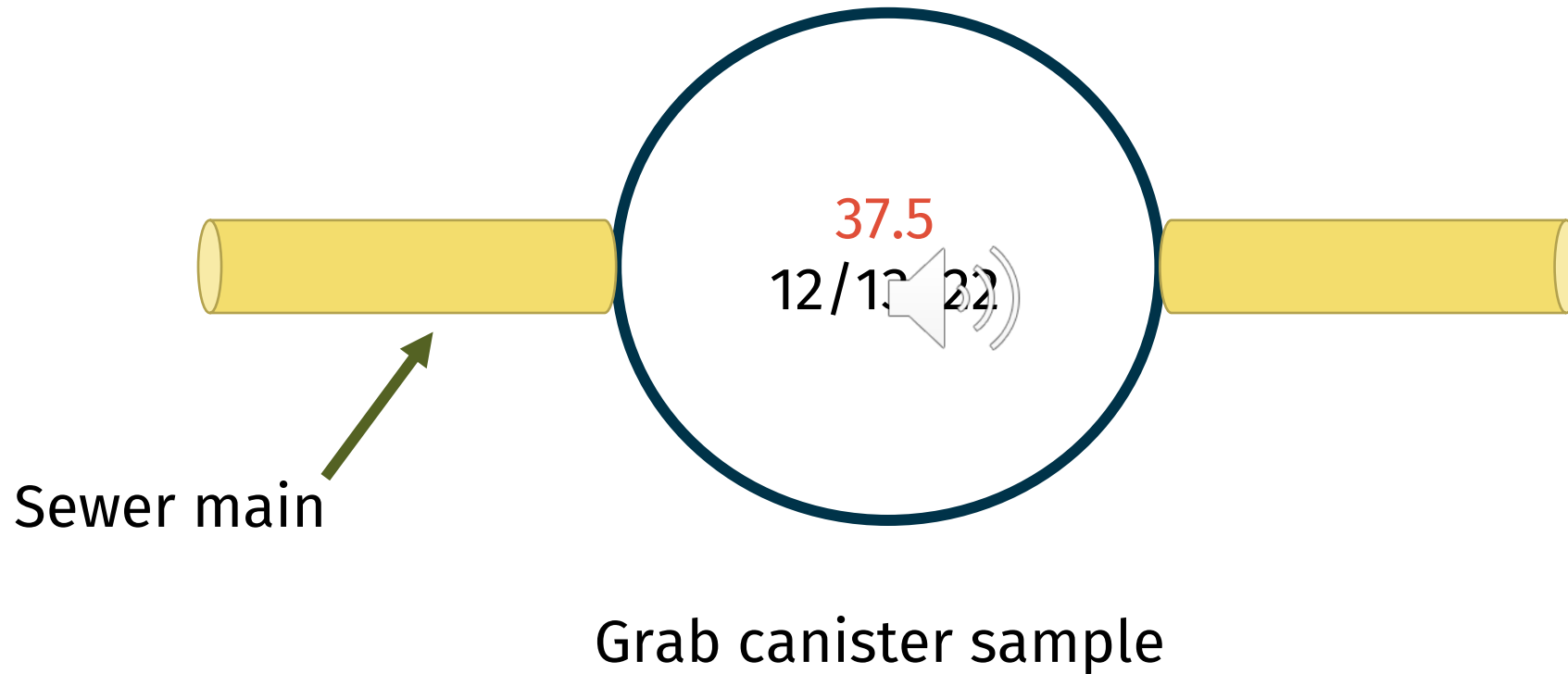
Site 1, Manhole 1





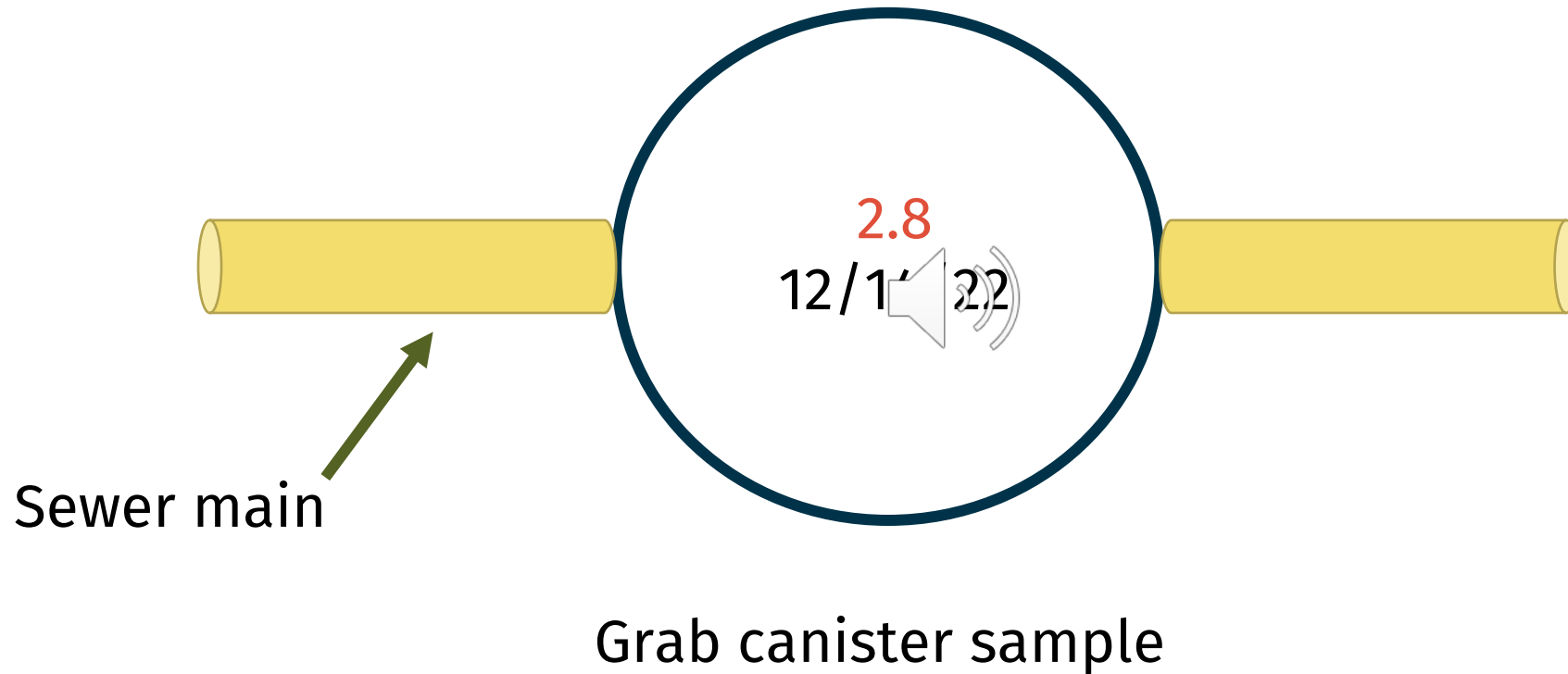
# Manhole TCE Vapor Concentrations ( $\mu\text{g}/\text{m}^3$ )

Site 1, Manhole 2



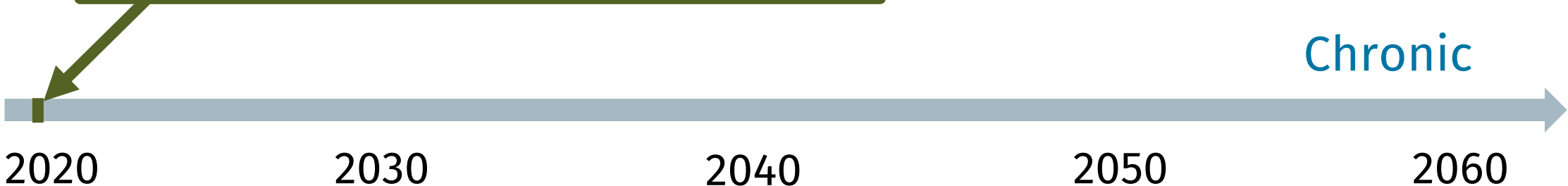
# Manhole TCE Vapor Concentrations ( $\mu\text{g}/\text{m}^3$ )

Site 1, Manhole 2



# TCE As An Acute Concern

DECEMBER 2020						
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
29	30	1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31	1	2



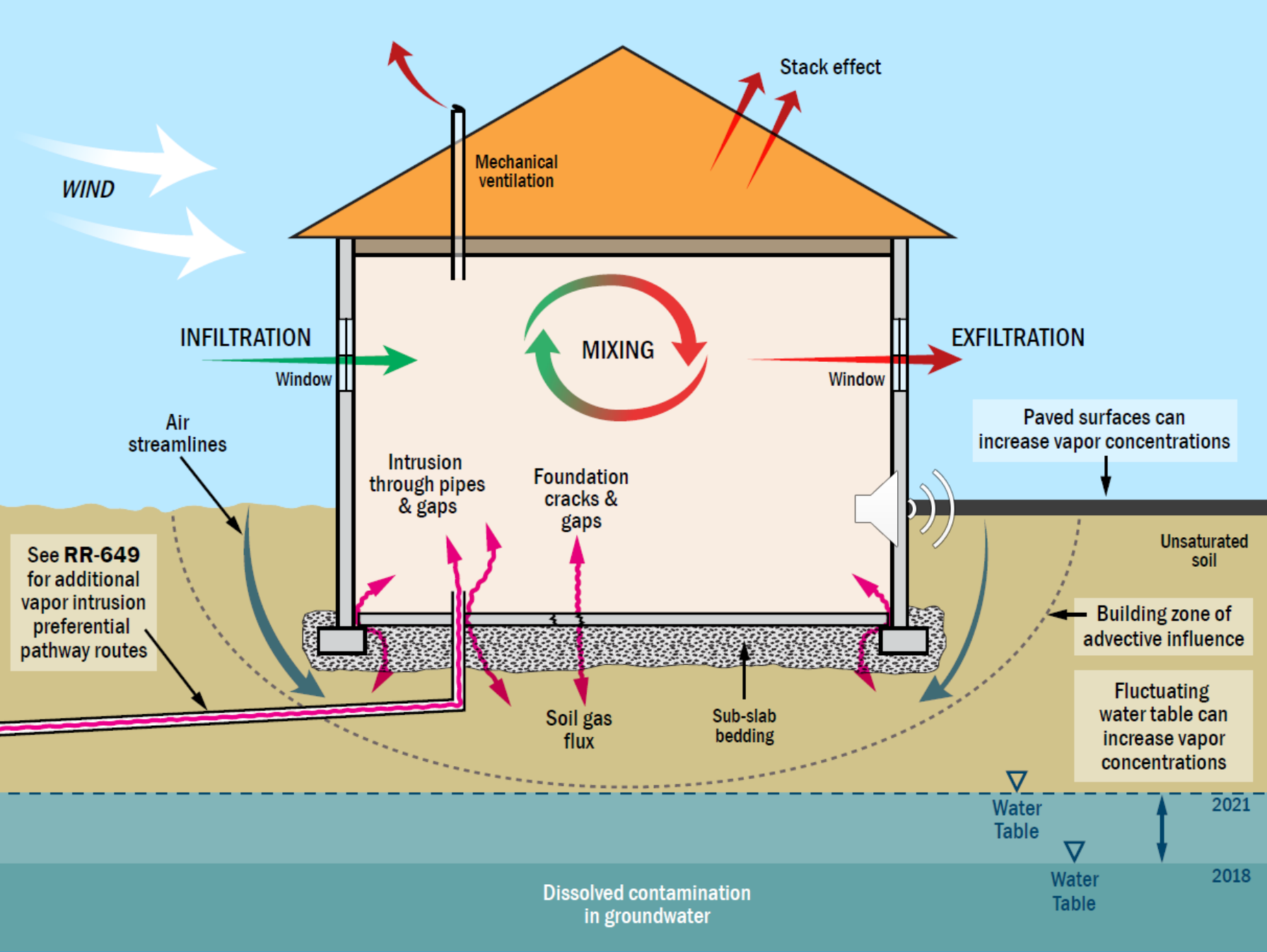
2020

2030

2040

2050

2060



# DNR Conceptual Model of the VI Pathway near a Building

# Passive Sorbent Sampling





## Nov. 16, 2022 – Passive Air Sampling For Vapor Intrusion


- PDF of slides and webinar recording 
- Go to [dnr.wi.gov](https://dnr.wi.gov), search “RR Program Presentations & Training Library”

⇒ **Subscribe to RR Report for  
notifications about future Issues & Trends**

<https://dnr.wisconsin.gov/topic/Brownfields/News.html>



# Passive Sorbent Samplers

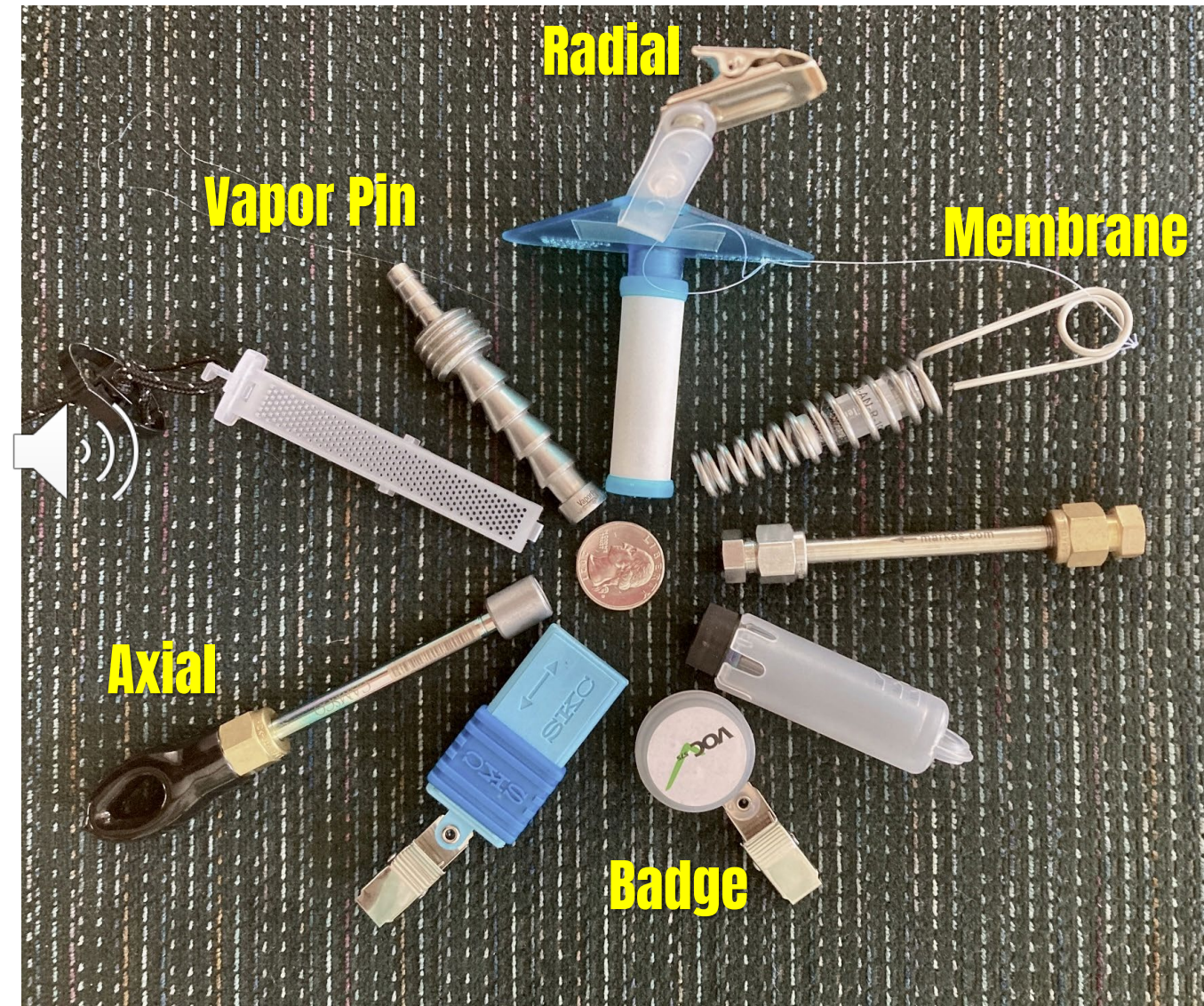
- Primary advantage
  - Time integrated concentrations up to weeks
  - Some samplers achieve reporting limits < vapor action levels within hours
- Ancillary advantages over canisters 
  - Shelf life
  - Availability
  - Rapid deployment
  - Small size
  - Reduced shipping costs and carbon footprint
  - No vacuum

# Passive Sorbent Samplers

Appropriate sampler and sorbent chosen based on:

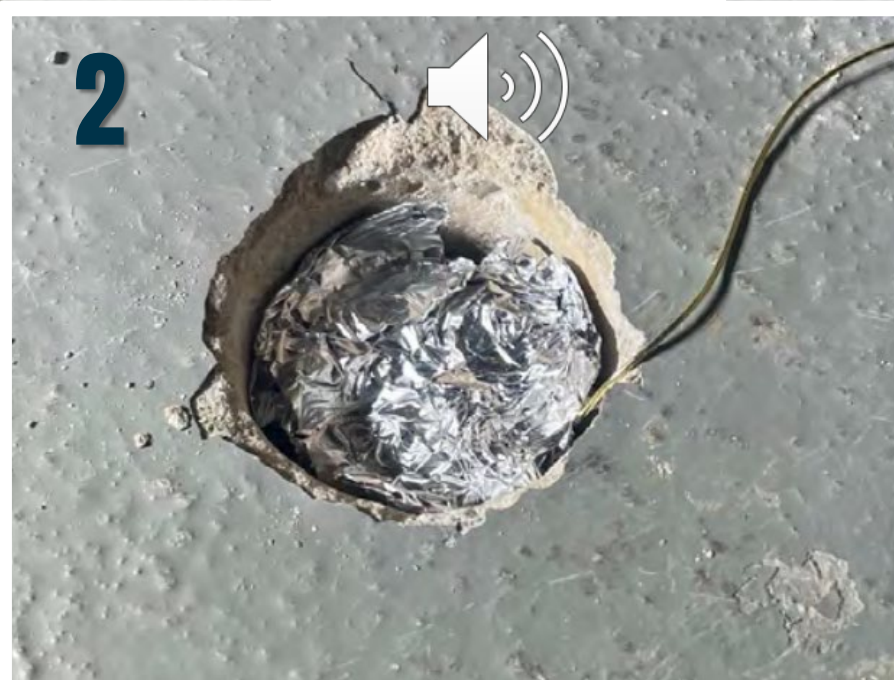
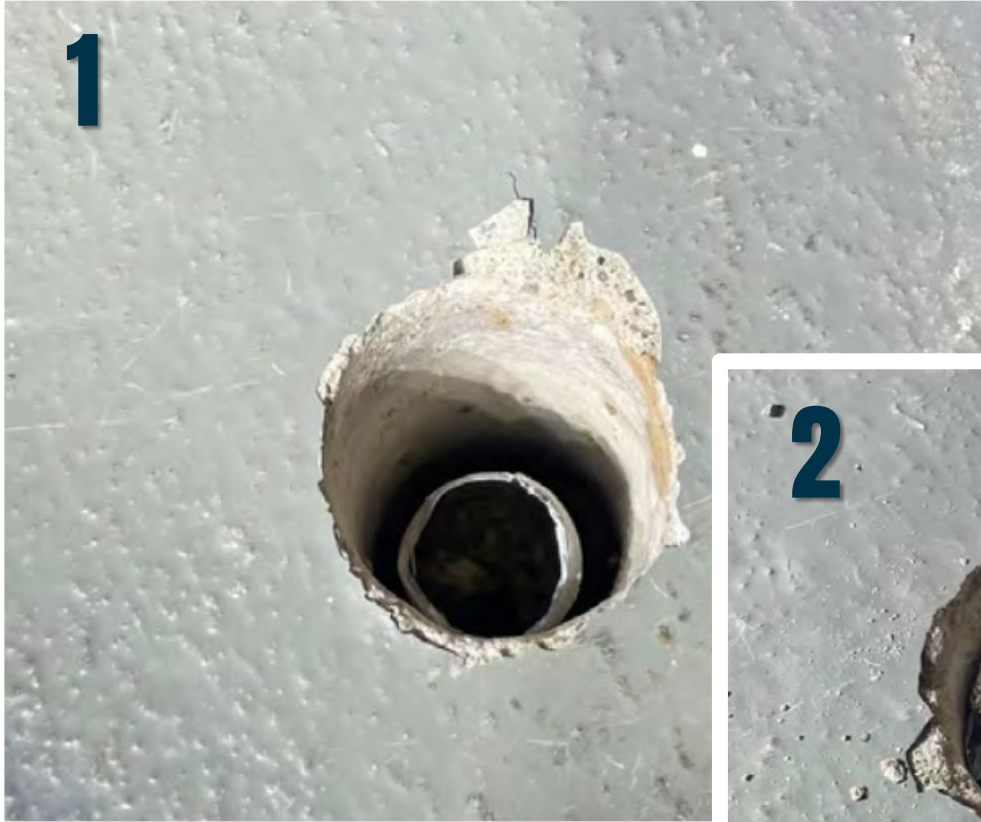
- Contaminants of Concern (COC)
- Duration of sampling
- Setting parameters
  - Air velocity
  - Temperature
  - Humidity
  - Physical limitations
  - Diffusion limitations (e.g., soil)

Always work closely with the lab!





# Passive Sub-slab Sampling

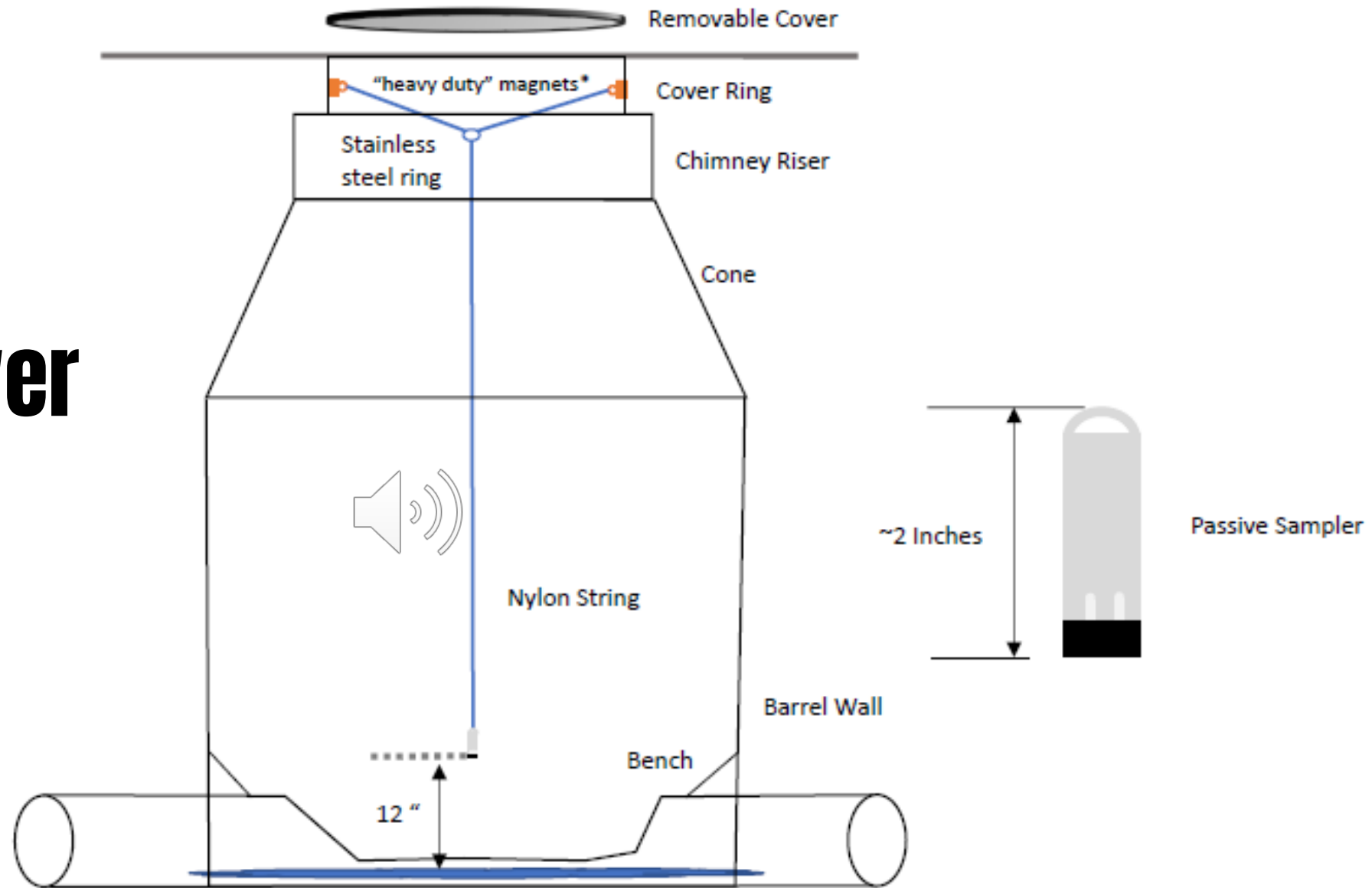




# Passive Sub-slab (new sampler holders)



# Passive Sanitary Sewer Manhole Sampling

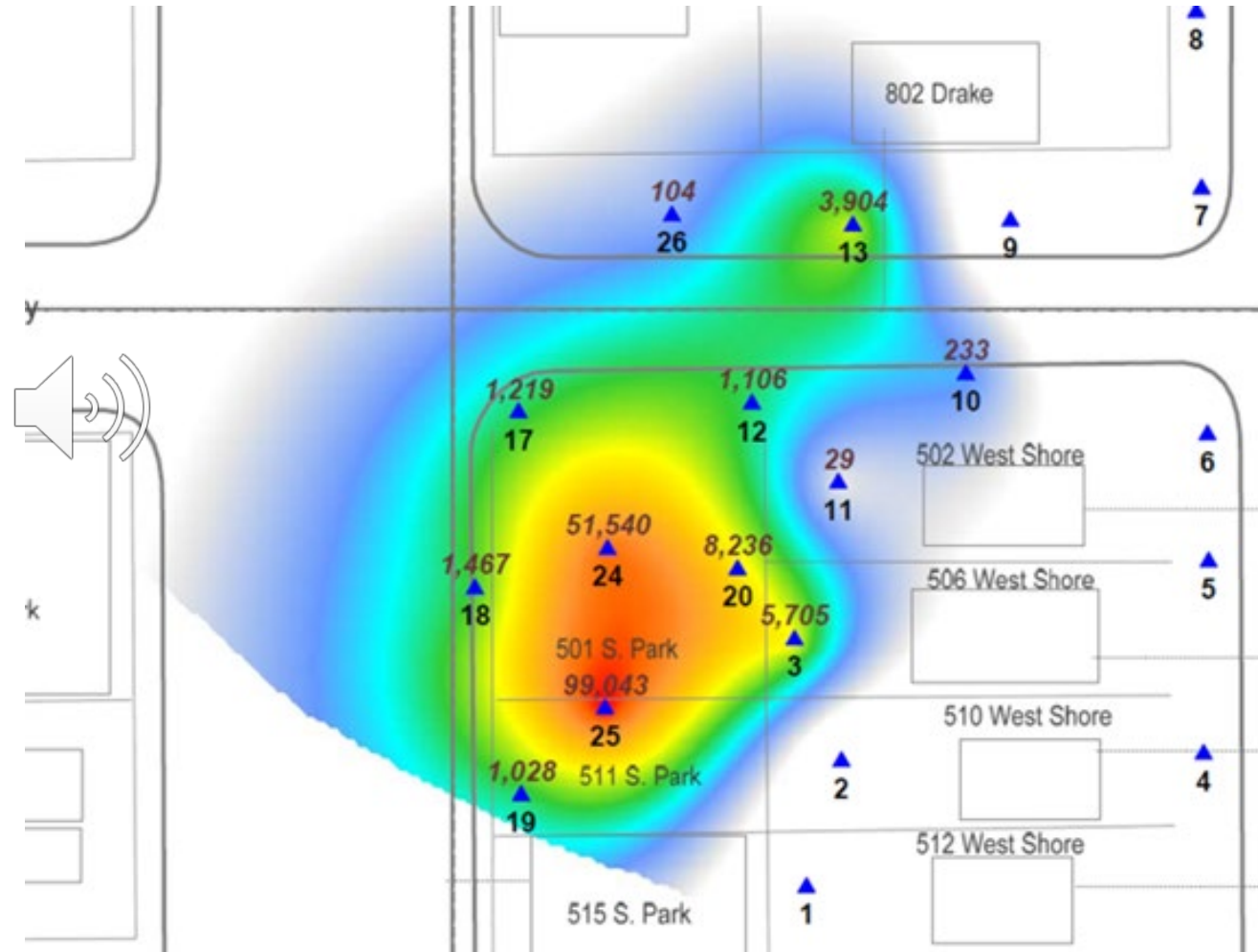
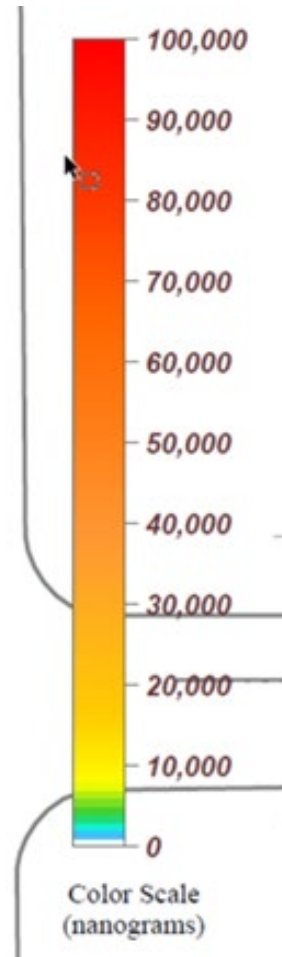


\*Neodymium magnets of at least 30 lb capacity, use 2-3 per sample



# Passive Soil Gas Sampling

TCE sorbed onto passive samplers (mass in nanograms)



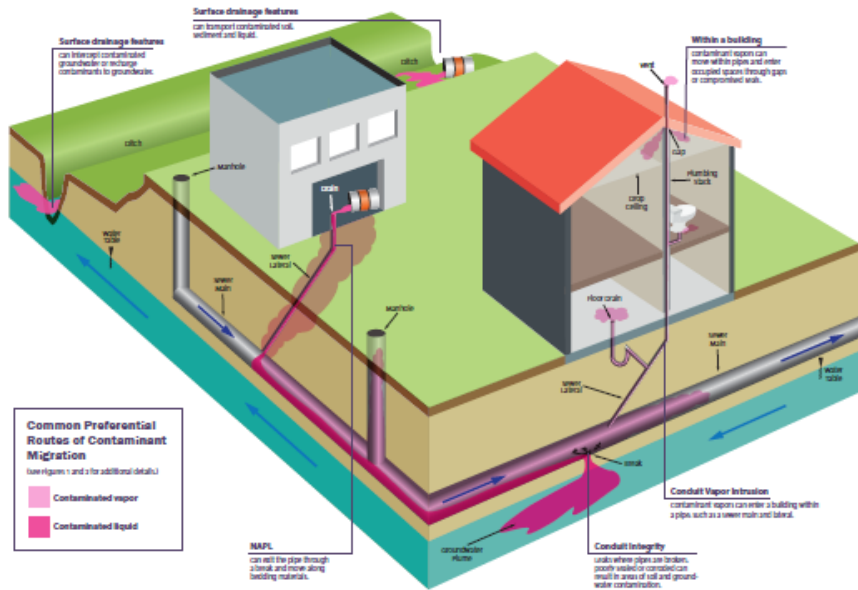


# Conduit VI





### Guidance for Documenting the Investigation of Human-made Preferential Pathways Including Utility Corridors



# Guidance for Documenting the Investigation of Human-made Preferential Pathways Including Utility Corridors (RR-649)

Go to [dnr.wi.gov](http://dnr.wi.gov), search “DNR RR-649”

#### Purpose

This guidance is for persons who perform and document investigation and remediation of sites with environmental contamination under Wisconsin Administrative Code (Wis. Admin. Code) chs. NR 700-799, including the Wisconsin Department of Natural Resources (DNR) staff who review such submittals. This guidance document presents ways that utility corridors and other human-made preferential pathways can influence contaminant migration, and methods to assess and options to sample these pathways to meet the requirements of Wis. Admin. Code § NR 716.11(5)(a).

Vapor migration through human-made preferential pathways and utility conduits is of particular importance. These preferential pathways may allow contaminant vapors to move from source areas into buildings, and to migrate beyond plume boundaries and historically recommended screening distances. This document focuses on vapor migration in utility conduits, but also relates to the preferential migration of contaminated groundwater, soil or surface water in human-made features.

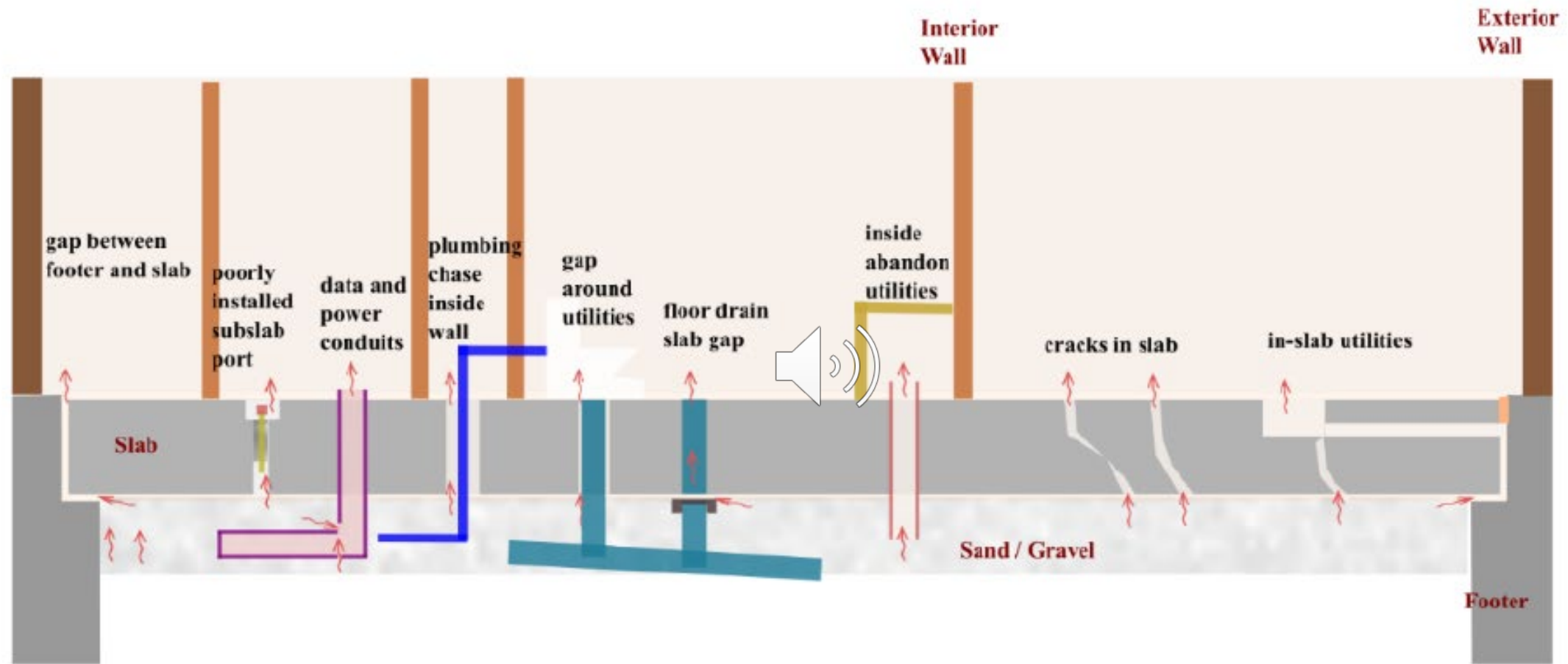
Publication: RR-649  
[dnr.wi.gov](http://dnr.wi.gov) Search: vapor

*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. 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.*

# Preferential Pathways (other than conduits)



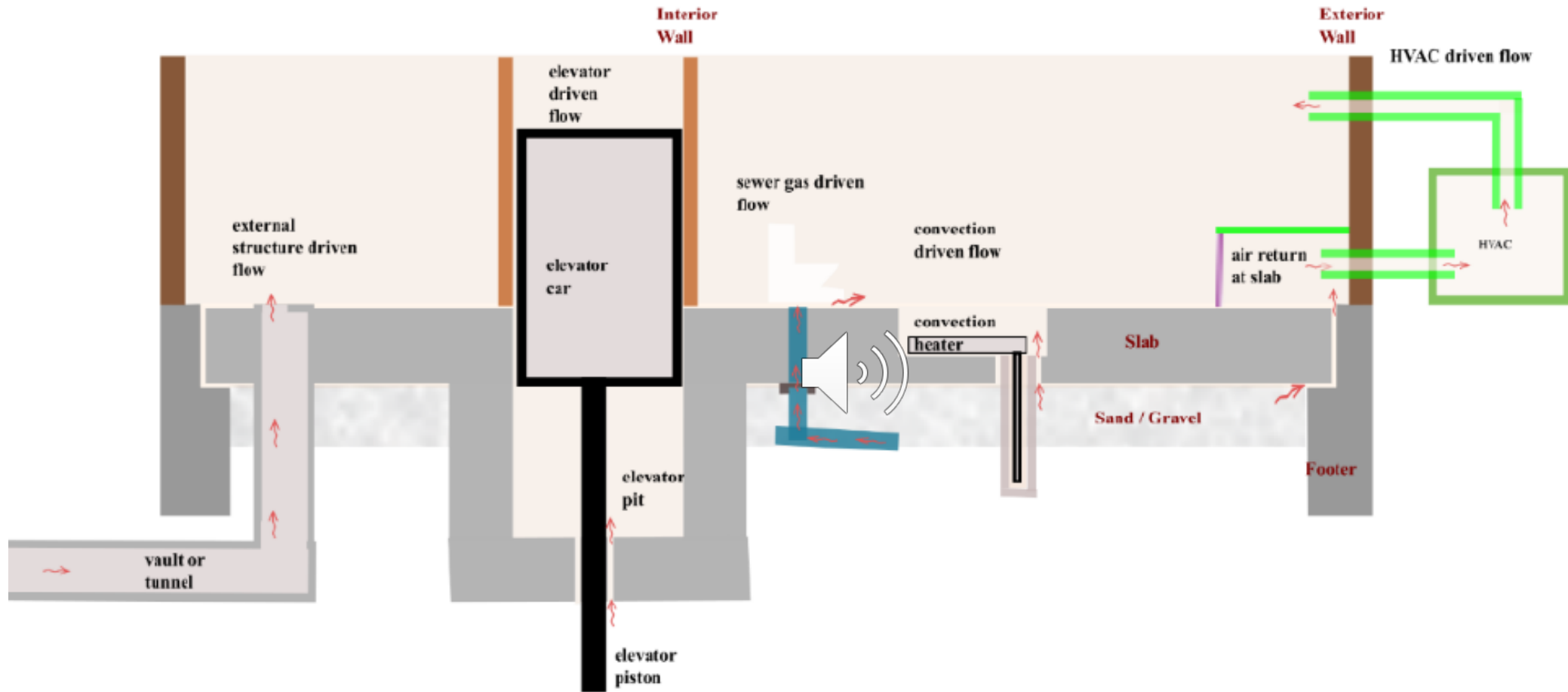
# Pathways Dependent on Indoor Pressure



Identifying and Evaluating Vapor Intrusion through Preferential Migration Routes and Points of Entry into Buildings

B. Schumacher, et. al.  
USEPA Nov 2021  
EPA/600/R-21/272

# Pathways with Independent Driving Forces



Identifying and Evaluating Vapor Intrusion through Preferential Migration Routes and Points of Entry into Buildings

B. Schumacher, et. al.  
USEPA Nov 2021  
EPA/600/R-21/272

# Real Time Assessment





# Real Time Assessment



# Real Time Assessment


- Accurate for intended purpose
  - Confirmed in use/not just marketing claim
  - Achieve Vapor Action Levels (VALs)/Vapor Risk Screening Level (VRSLs), as appropriate
- Calibrated/re-calibrated per manufacturer's recommendations
- Do research before the device is needed
- Communicate relevant information to DNR Project Manager



# New and Renovated Buildings at Contaminated Settings




# Redeveloped or Reoccupied Building

- Involve DNR early
- Incorporate VI in construction schedule
- Use passive soil gas sampling to characterize source
- Assess off-gassing building materials 
- Pre-redevelopment remediation



# Redeveloped or Reoccupied Building

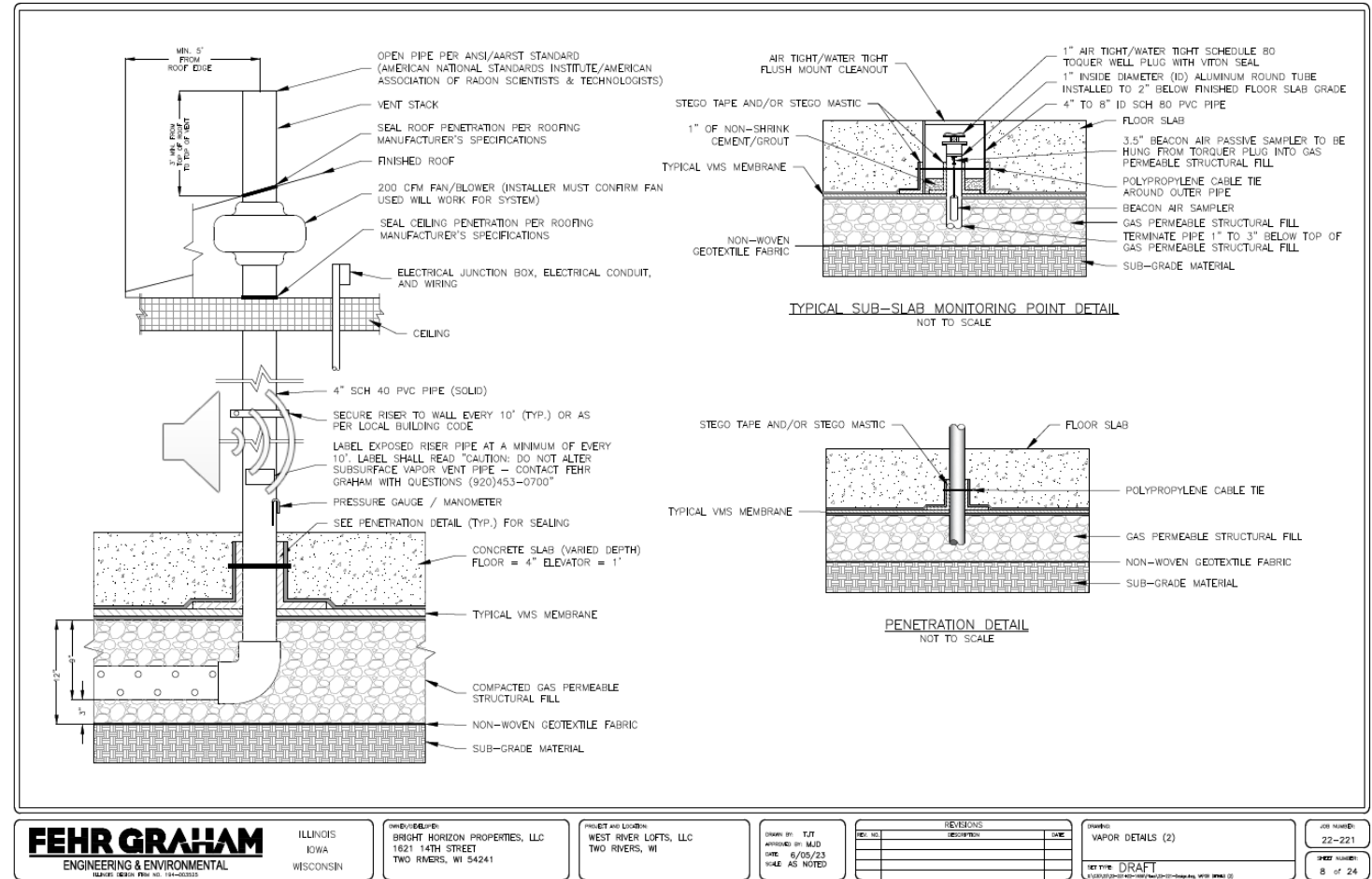
- Preferential VI routes
- Robust mitigation
- Good construction quality control best practices
- Incremental redevelopment sampling 
- Comprehensive indoor air sampling before occupancy





# New Building at Contaminated Sites

- Involve DNR early
- Incorporate VI in construction schedule
- Use passive soil gas sampling to characterize source
- Pre-redevelopment remediation



**FEHR GRAHAM**  
ENGINEERING & ENVIRONMENTAL

ILLINOIS  
IOWA  
WISCONSIN

PROJECT MANAGER:  
BRIGHT HORIZON PROPERTIES, LLC  
1621 14TH STREET  
TWO RIVERS, WI 54241

PROJECT AND LOCATION:  
WEST RIVER LOFTS, LLC  
TWO RIVERS, WI

DRAWN BY: EJT  
APPROVED BY: MLD  
DATE: 6/05/23  
SCALE: AS NOTED

REV. NO.	DESCRIPTION	DATE

QUANTITY: VAPOR DETAILS (2)
DATE PLOTTED: DRAFT

JOB NUMBER: 22-221
SHEET NUMBER: 8 of 24

# New Building at Contaminated Sites

- Preferential VI routes
- Robust mitigation
- Good construction quality control
- Sub-slab vapor and comprehensive indoor air sampling before occupancy
- Allow for DNR review time in project planning





# Rapid Response Mitigation (RRM)



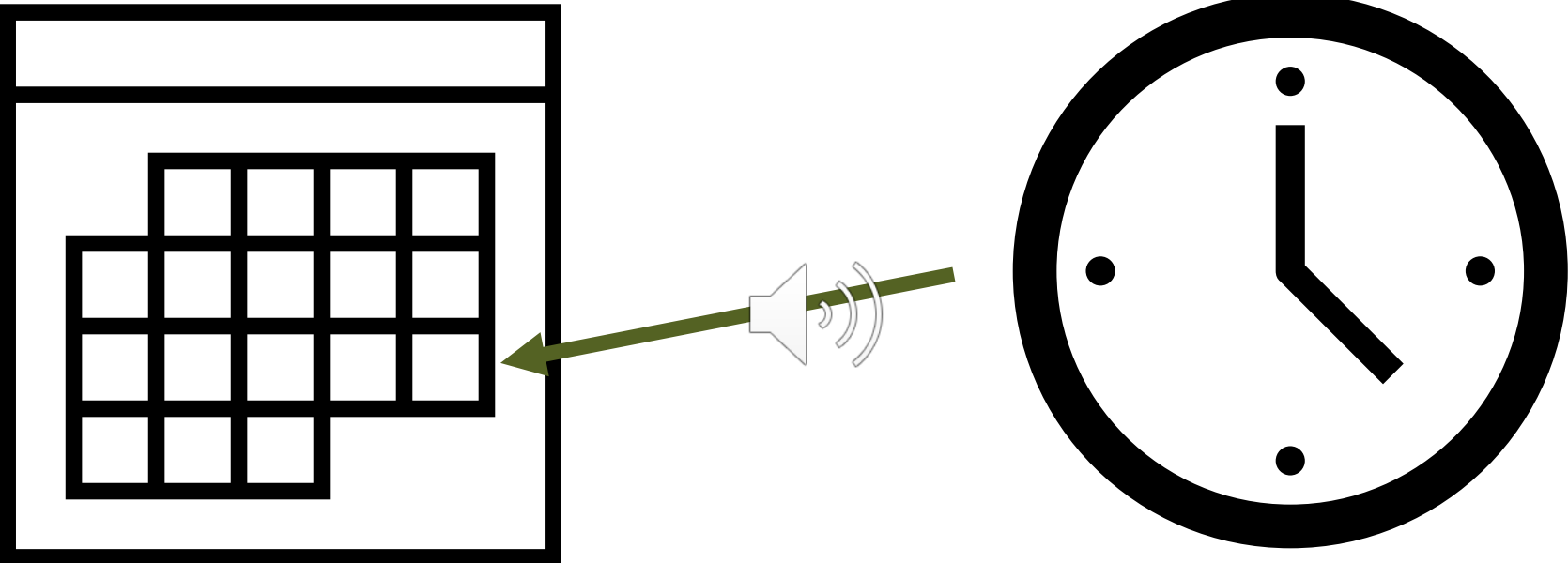
# RRM - Timeframes

- Letter from Department of Health Services (DHS) to DNR defining a "single exposure" referenced in DHS March 25, 2021 letter
- Letter from DHS to DNR with recommended time frames and response actions at vapor intrusion sites
- DHS response to Request for Opinion on risk guidelines in DNR's Vapor Intrusion Guidance RR-800; comments to immediate action criteria and Trichloroethylene (TCE) acute risk

Go to [dnr.wi.gov](http://dnr.wi.gov), search “Vapor Intrusion Resources for Environmental Professionals”



# RRM



# RRM

- Notification
- Source and Pathway Identification
- Pathway Sealing
- Ad Hoc Ventilation
- Indoor Air Treatment
- HVAC Modification
- Long-term Mitigation
- Confirm Indoor Air Quality



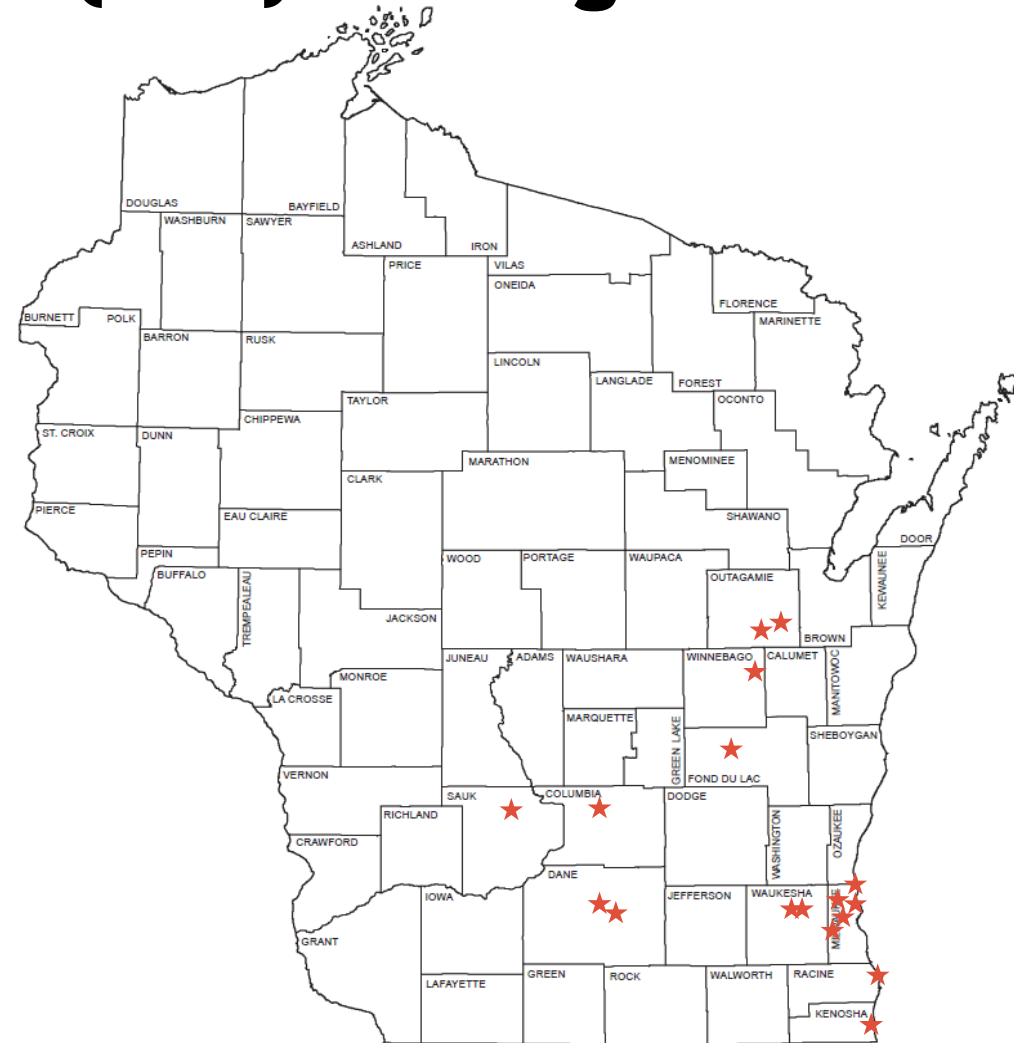
# State Funded Vapor Investigations



# DNR Vapor Intrusion Zone Contract (VIZC) or Vapor Intrusion Assessment Contract (VIAC) Investigations

## Priority Factors

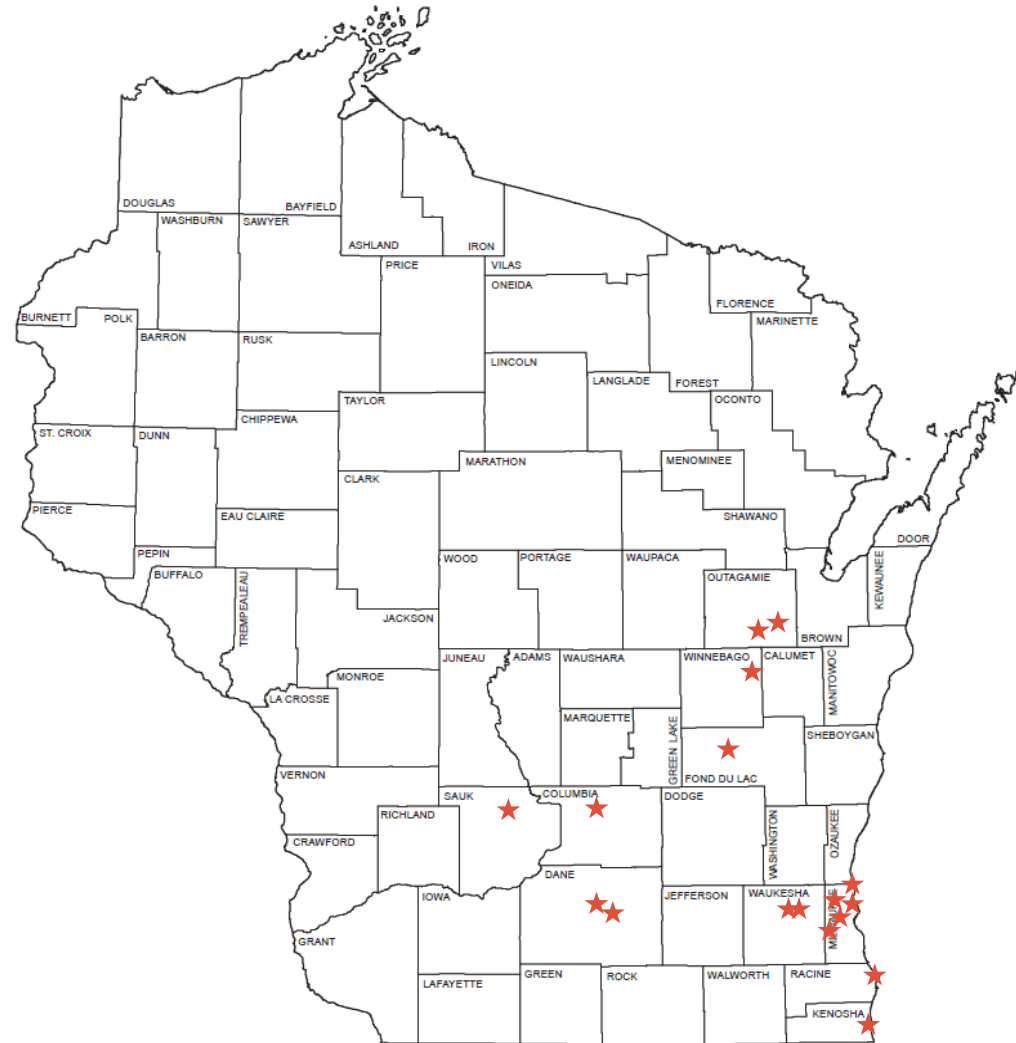
- Presence and concentration of TCE and Perchloroethylene (aka PCE or Perc)
- # properties
- Sewer impact
- Population
- Social vulnerability
- Investigation status






# VIZC / VIAC

- 9 Investigations completed or started
- 8 Buildings sampled
- 3 Buildings mitigated
- 2 Mitigation system evaluated or upgraded
- 6 Sanitary sewer systems sampled



# Takeaways

- Consider variability and all pathways in VI Conceptual Site Model
- Use the appropriate investigation tool
- New or renovated buildings – **be proactive** with sampling, remediation, mitigation, and communication
- Have a RRM plan before sampling a building 
- Reach out to the DNR Project Manager with questions
- Numerous unreported discharges still pose a VI risk

# Questions?

THANK YOU!



# CONNECT WITH US

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OFF THE RECORD"