Summary of State Approaches to Vapor Intrusion – 2023 Update

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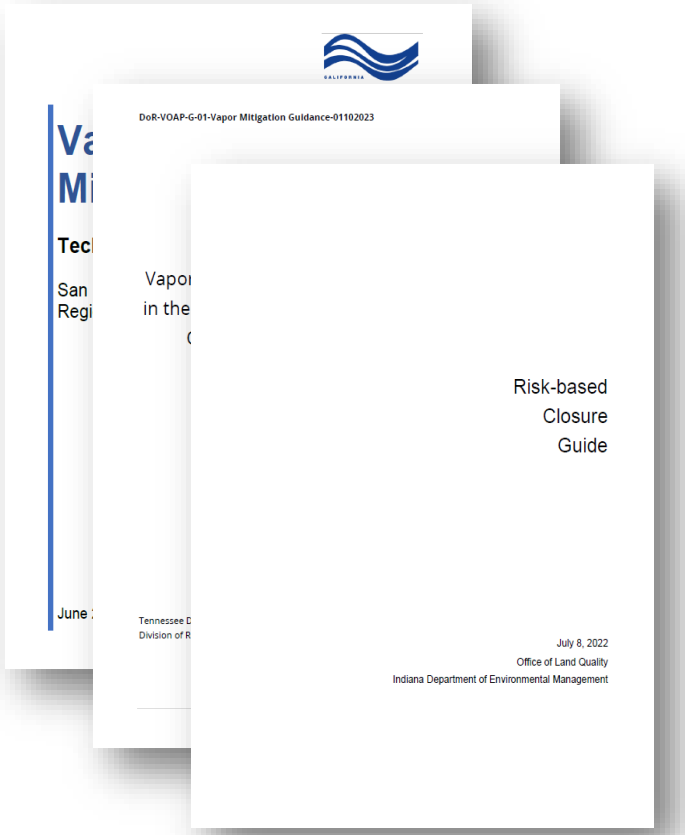
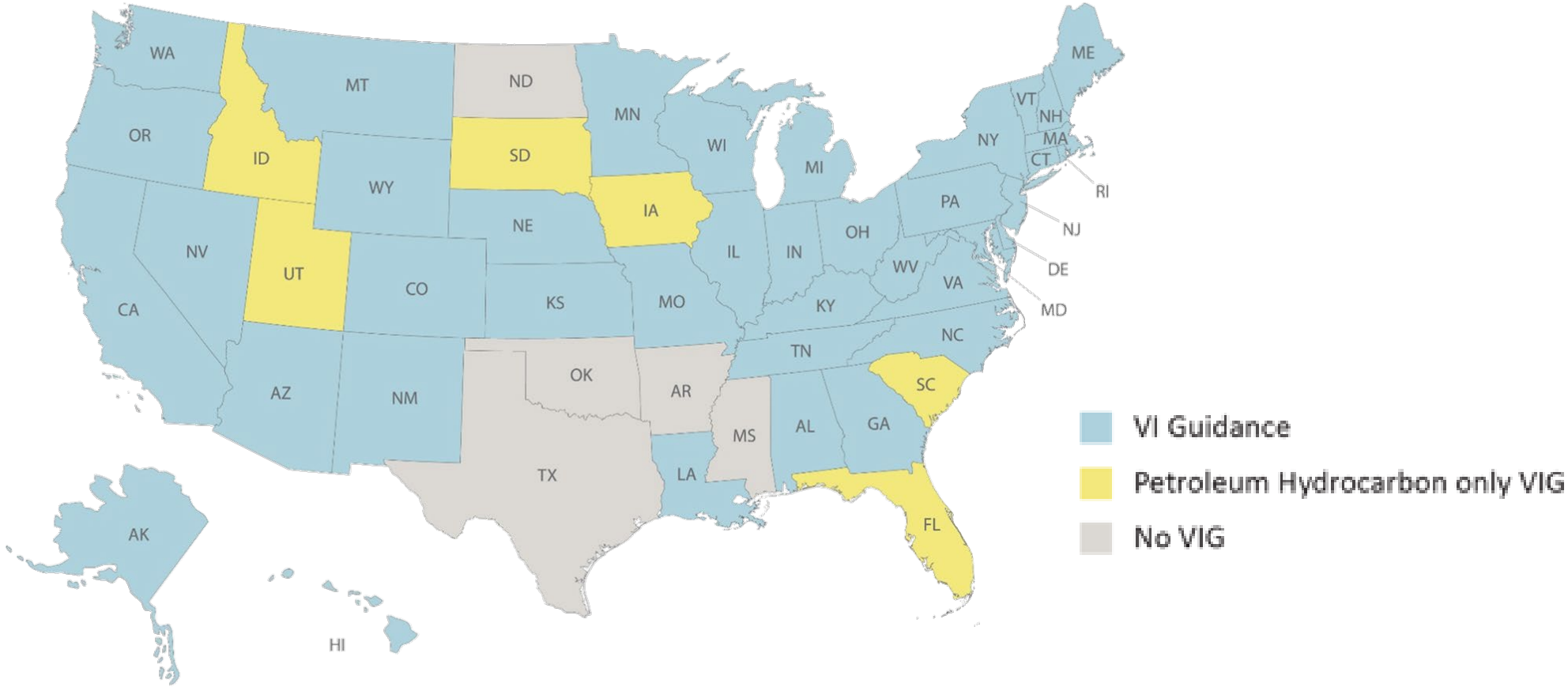
Approach

- **Updated** survey by Eklund, Beckley, and Rago published in 2018
- **Identified and reviewed** available vapor intrusion (VI) guidance documents and regulatory screening levels
- **Looked for areas of consensus and areas of divergence** among the states



States with VI Guidance, as of April 2023



KEY POINT

Majority of US states have their own VI guidance. 30 new guides or updates since 2017 (as of April 2023).

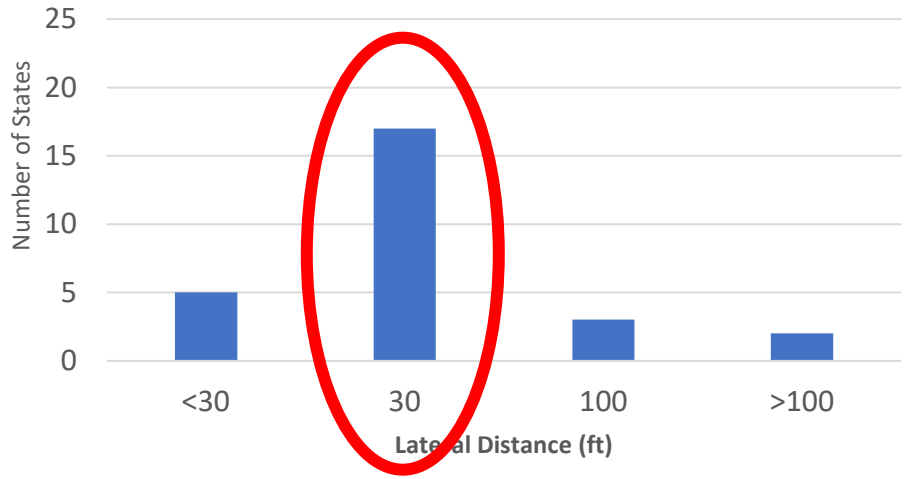
Key Elements of Guidance

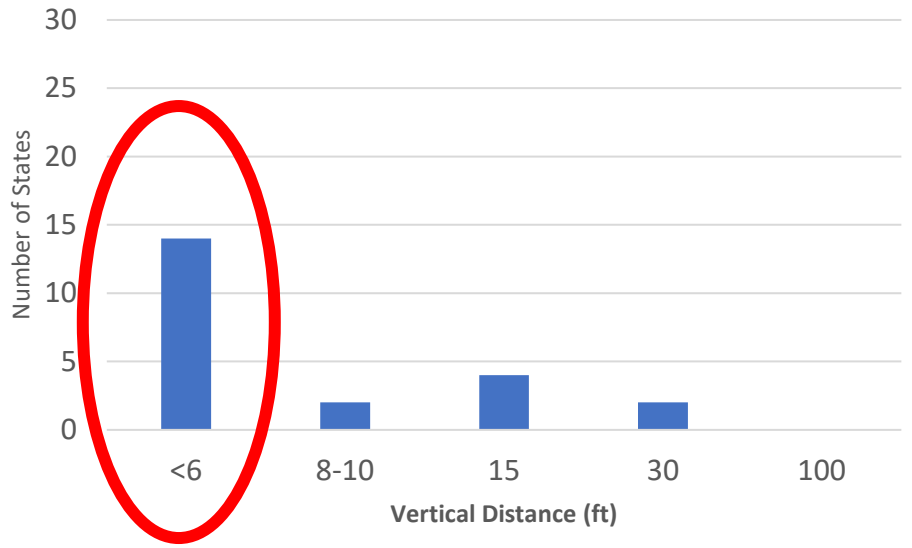
- Exclusion distances
- Types of screening values
- Specific numeric screening values
- Attenuation factors
- Preferential pathways
- VI mitigation

Photo courtesy R. Rago

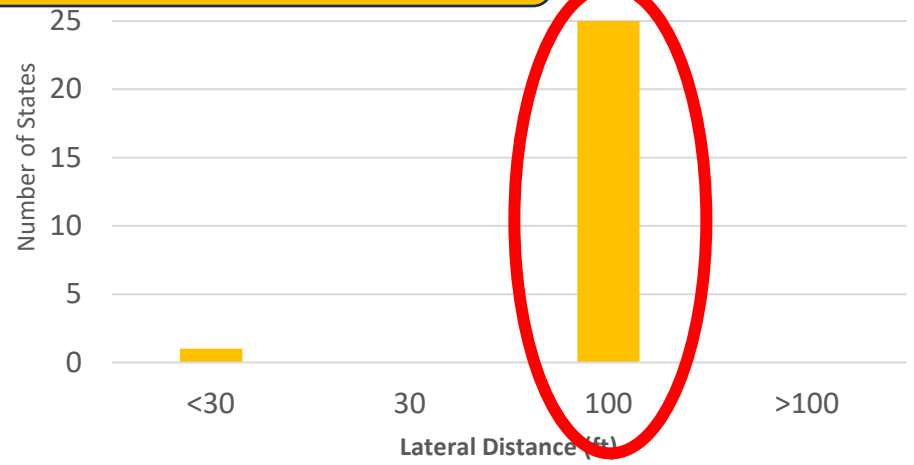
Exclusion Distances

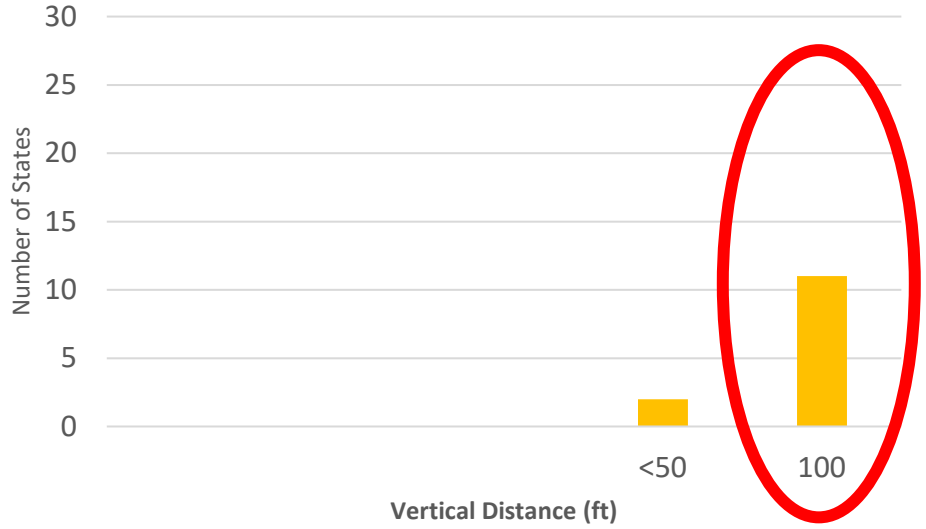
Petroleum VOCs (dissolved phase)





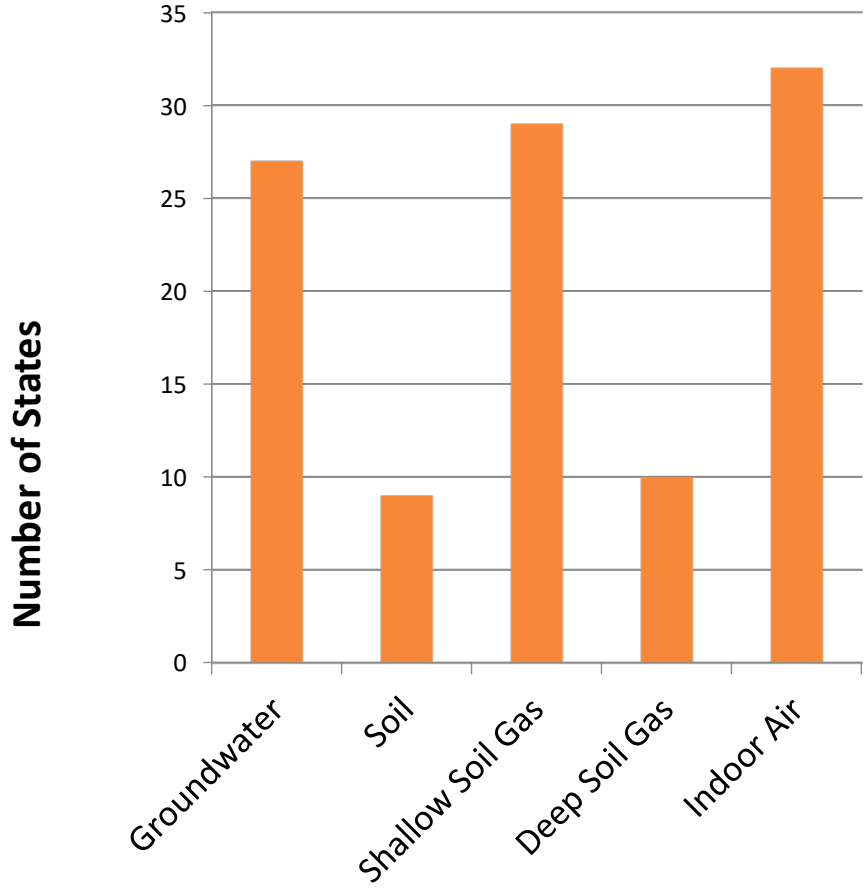
Chlorinated VOCs



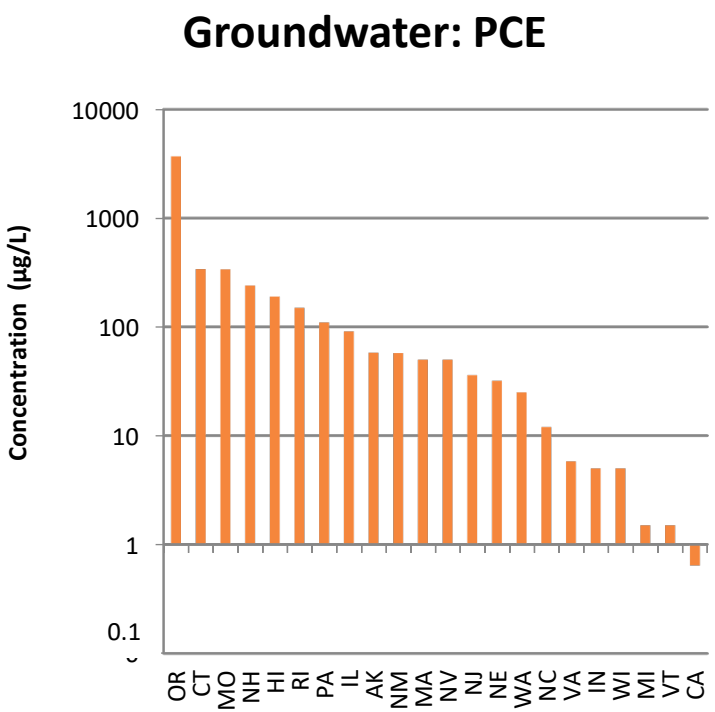


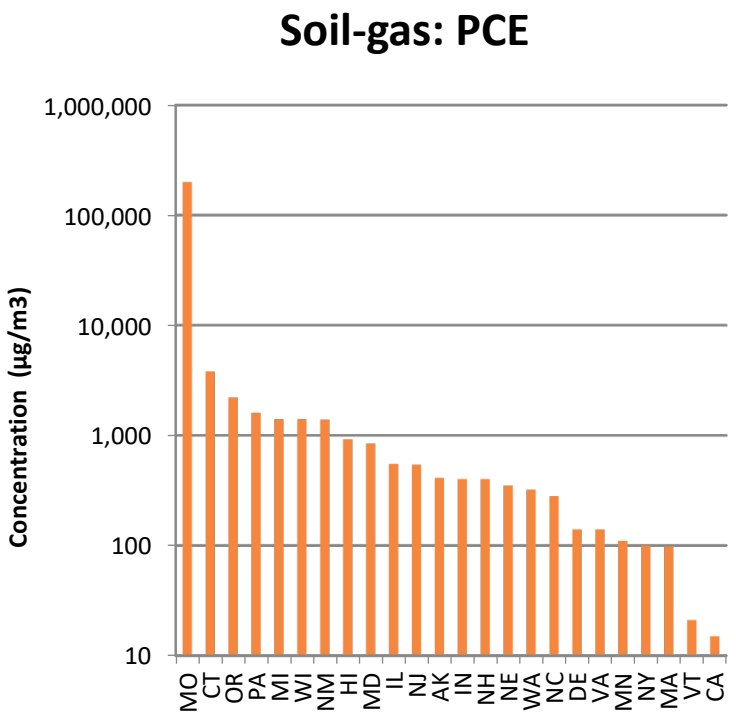
Screening Values

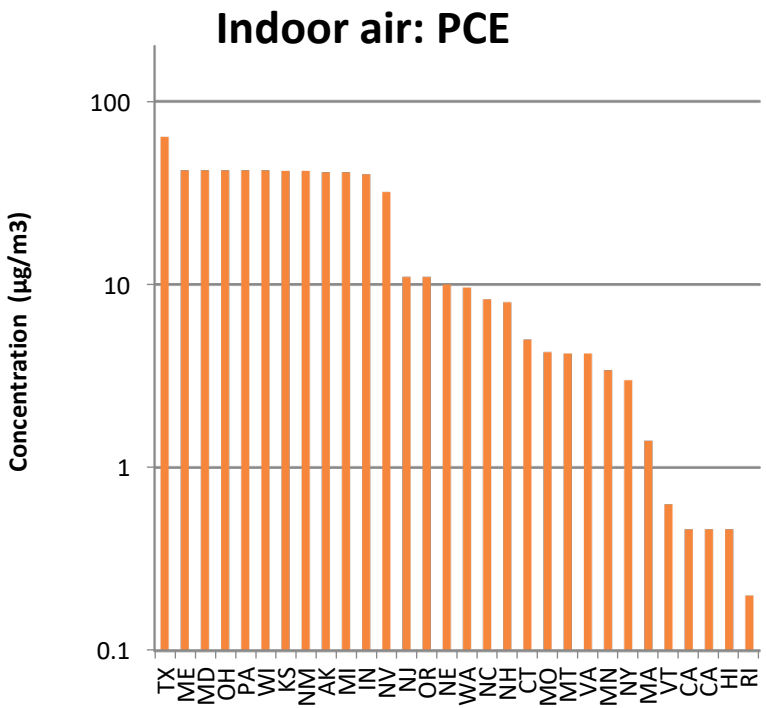
- Little consistency among states
- More reliance on groundwater, shallow soil gas, and indoor air to understand if VI is a concern



Example Range of Screening Levels Across States







Selected Screening Values - TCE

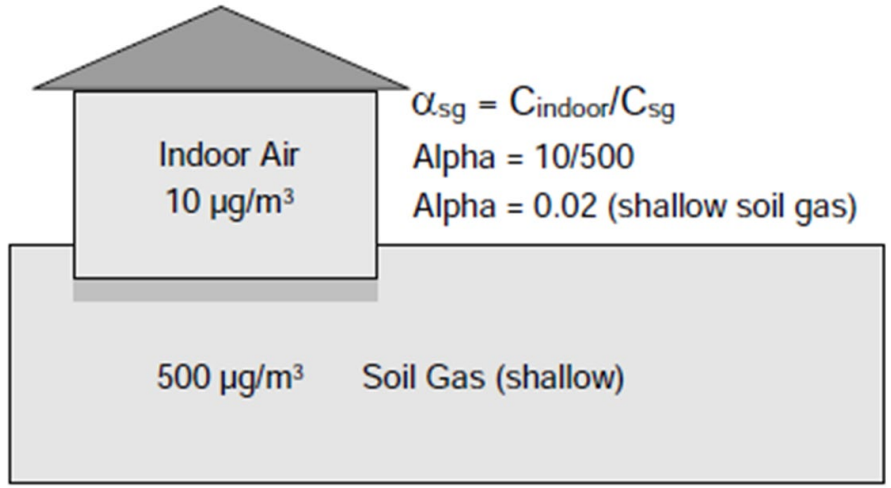
Compound	California	New Jersey	Missouri	Range of Values
Groundwater (µg/L)	1.2	3	1,600	22,000x
Soil Gas (µg/m^3)	16	34	546,000	91,000x
Indoor Air (µg/m^3)	0.48	1.1	12.8	64x

95th percentile residential indoor air background falls here

Residential background: Dawson and McAlary 2009 (95%ile 1.6 ug/m3); USEPA 2011 (range of 95%ile 0.56 – 3.3 ug/m3)

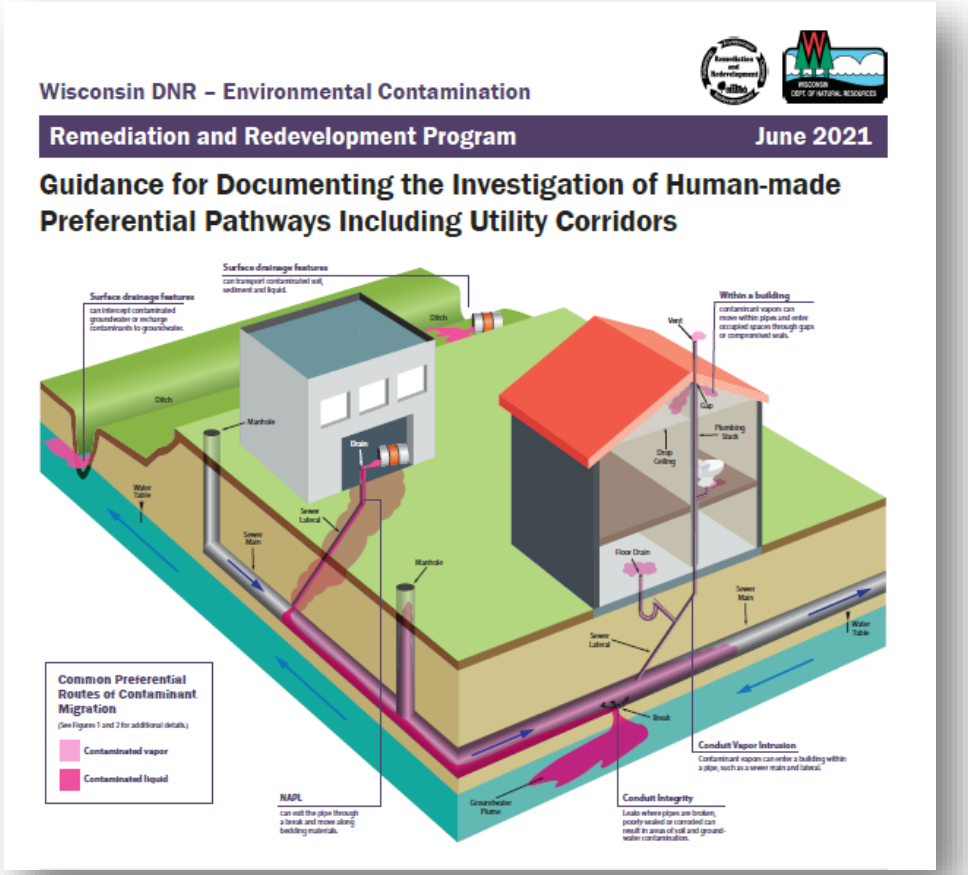
Attenuation Factors

- Groundwater values generally 0.001
- Deep soil gas values generally 0.01-0.03
- Shallow soil gas values generally 0.1-0.03
- Crawl-space values are 1.0 in all 16 states that give values
- Only a few states use different soil gas-to-indoor air attenuation factors for residential and non-residential structures (e.g., IN, OR)



Preferential Pathways

- Growing recognition of the significance of preferential pathways, particularly sewers/subsurface conduits
- Reflected in recent guidance updates, notably IN and WI



Vapor Intrusion Mitigation: *Mentioned by 26 States*

16 states have a target for differential pressure across slab (ranging from “have a negative field” to 10 Pa)

11 states specify a recommended thickness for a vapor membrane (ranging from 3 to 100 mils, with most states between 30 and 60 mils)

15 states provide emission rate thresholds that may trigger emission controls and/or permitting

Wrap-up: *Observations*

- Some **consensus on lateral screening distances** (e.g., 30 ft. for petroleum hydrocarbons and 100 ft. for chlorinated solvents)
- Many states are using **attenuation factors** of 0.001 for groundwater, 1 for crawl spaces, and 0.01-0.03 for soil gas

- Still lots of **variability in types of screening levels**, numbers of VOCs covered, and specific numeric values for screening individual VOCs. No expectation of consensus on these issues in the next few years.
- States find it **challenging to address what steps to take after a site is screened in**. Relatively little information is given in most states' VIG about preferential pathways, mitigation, short-term exposures, etc.

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