

Petroleum Vapor Intrusion (PVI) 2025

Updates

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Technical Guidance Documents:

- [NAPL Glossary of Terms](#)
- [Monitored Natural Attenuation](#)
- [Site Closure Evaluation, Including Petroleum Mixing Zones](#)
- [Prioritization of Petroleum Release Sites](#)
(Priority Ranking Guidance for Petroleum Tank Releases)
- [Permeations of Waterlines by Petroleum Constituents](#)
- [Purge Water Disposal Flowchart](#)
- [Groundwater Sampling Guidance](#)
- [Montana LNAPL Recovery and Monitoring Guidance](#)
- [Data Validation Summary Form](#)
- [Montana Vapor Intrusion Guide](#)

The following are links to example field sampling forms that may be of assistance.

- [Ambient Air Sampling Form](#)
- [Indoor Air Sampling Form](#)
- [Subslab Soil Vapor Sampling Form](#)

APH VI Calculator

*The Air-Phase Petroleum Hydrocarbon Vapor Intrusion (APH VI) Screening Level Calculator is designed as a simple screening tool to determine if vapor intrusion exceeds generic risk-based screening levels at sites with only **petroleum contamination**. This calculator is **not** meant to be used with solvent sites or mixed waste sites containing a combination of petroleum and other sources. The results from this calculator should be considered one of the multiple lines of evidence in your vapor intrusion investigation. Below you will find the APH VI Screening Level Calculator as well as the VI APH Calculator Discussion that explains how to use the calculator and the general assumptions used for site-specific vapor intrusion risk assessment/analysis (also found on [DEQ SRS's FAQs website](#)).

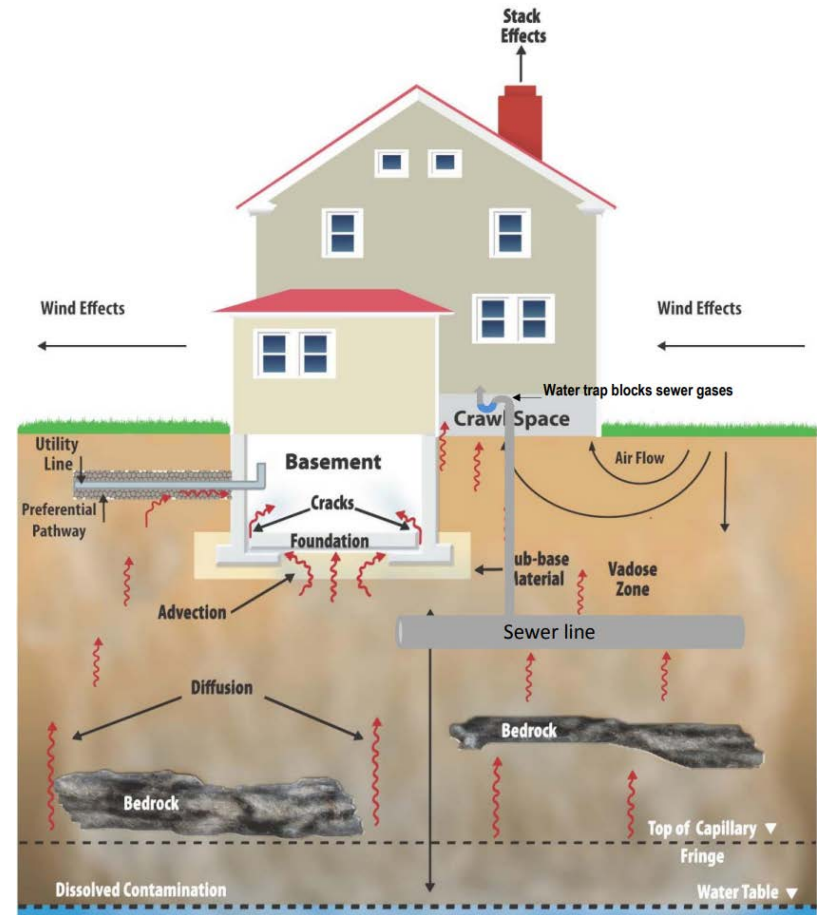
[APH VI Calculator](#)

Vapor Intrusion Assessment

- DEQ Work Plan Request Letter
 - “Complete a Vapor Intrusion Assessment...”
 - This is a desktop analysis of:
 - Conceptual Site Model
 - Lateral Inclusion Zone
 - Vertical Screening Distances
 - Foundations of Structures
 - Preferential Pathways
 - Utility Locations
 - Historical (and current) soil and groundwater data
- After desktop analysis discuss with DEQ Project Officer.
 - Multiple lines of evidence approach
- **DO NOT GO DIRECTLY TO INDOOR AIR SAMPLING!**

Development of CSM

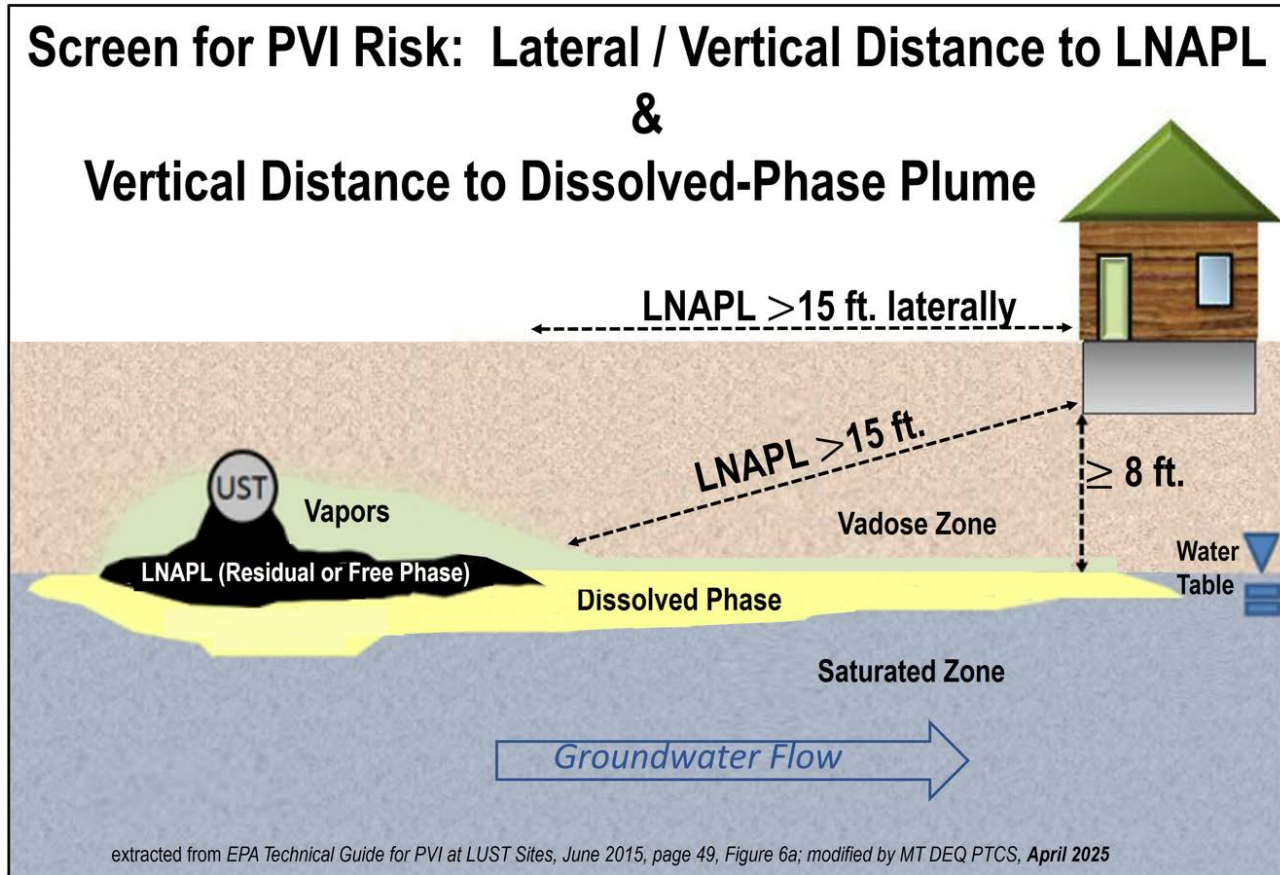
- When completing the CSM several questions should be asked to identify any precluding factors or preferential pathways that would likely prohibit the site from using lateral and vertical screening distances.
- Protective of human health.
- Note that if COC concentrations in soil and groundwater are below regulatory criteria screening distances are not necessary.



Lateral Inclusion Zone

- First assess if there are any structures within 30 lateral feet of the edge of the defined soil and groundwater plume.
- If so, move to next step, vertical screening distances.

Vertical Figure



What Next?

- When the PVI pathway does not screen out...
- Mitigation (when appropriate)
- Sampling
 - Section 3.5 SAP Development: Area of VI Investigation
 - When building is in direct contact with petroleum contaminated soil/groundwater direct to indoor air sampling
 - Building is not in direct contact with petroleum contaminated soil/groundwater use a phased approach starting with exterior soil vapor probes

Vapor Intrusion Screening Levels

Sub-slab and Soil-Vapor

- Only applicable to sub-slab and/or soil-vapor samples collected below or adjacent to a completed concrete foundation.
- **Not applicable to vapor samples collected from crawl space, building/structure living space, or any confined space lacking a solid concrete slab.**

Soil Gas - Near and Sub-slab Screening Levels		
Analyte	Screening Level for Sub-Slab and Near Slab Residential	Screening Level for Sub- Slab and Near Slab Industrial
Benzene	10	60
Ethylbenzene	40	200
Toluene	20,000	70,000
Xylenes	300	1,000
MTBE	400	2,000
Naphthalene	3	10
C5-C8 Aliphatic	2,000	10,000
C9-C12 Aliphatic	700	3,000
C9-C10 Aromatic	200	700
DCA	4	20
EDB	0.2	0.8

APH Calculator

Crawl Space, Indoor Air, Other

APH				
Chemical	DEQ/EPA RSL Screen ($\mu\text{g}/\text{m}^3$)*			
	Residential	Industrial	Background	C/nc
1,2-Dichloroethane (DCA)**	0.12	0.53	0.23	C**
Aliphatic (C5-C8)	73	310	94	nc
Aliphatic (C9-C12)	21	88	44	nc
Aromatic (C9-C10)	5.2	22		nc
Benzene	0.40	1.8	1.3	C**
Ethylbenzene	1.3	5.5	1.1	C*
Ethylene dibromide (EDB)	0.0052	0.023		C
MTBE	12	53		C*
Naphthalene	0.092	0.40	0.39	C**
Toluene	520	2200		nc
Xylenes (mix of m,p- & o-)	10	44		nc

C= carcinogen value derived the screening level

n/c = non carcinogen value derived the screening level

**= where nc SL < 10X ca SL

* = where: nc SL < 100X ca SL

How to Calculate Tier II APH

Incorrect or Incomplete Lab Analysis

- Only analyzing for BTEX and not including all analytes from APH calculator:

Chemical	DEQ/EPA RSL Screen ($\mu\text{g}/\text{m}^3$)
1,2 Dichloroethane (DCA)	0.23
1,3 Butadiene	0.10
Aliphatic (C5-C8)	94
Aliphatic (C9-C12)	44
Aromatic (C9-C10)	10
Benzene	1.3
Ethylbenzene	1.2
Ethylene Dibromide (EDB)	0.0052
Xylenes (mix of m,p & o)	10.0
Methyl Tert Butyl Ether (MTBE)	12
Naphthalene	0.39
Toluene	520

- Some analytes may be excluded based on soil and groundwater data

Reporting Limits

- Laboratory difficulty meeting reporting limits for EDB, and Naphthalene
- Discuss with lab prior to sampling to determine RLs and how they will be addressed

Leak Tracer Testing

- Will be performed on soil vapor samples and sub-slab samples
- DEQ's preferred method is helium
- Can use 'other' methods however a description of the method and how it will detect leaks is required in the work plan and be approved by DEQ Project Officer.

Future of PVI Guide

- Updates to address lessons learned
- ITRC Vapor Intrusion Updates
- Welcome consultant input

Questions?