

**WI Vapor Quick Look-Up Table <sup>1,2</sup>**  
**Indoor Air Vapor Action Levels and Vapor Risk Screening Levels**  
Based on **November 2017** U.S.EPA Regional Screening Levels

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	530	160	16	4.9	1,600	490	78.11	c				
Carbon Tetrachloride	4.7	0.73	160	24	20	3.1	670	100	20	3.1	2,000	310	153.82	c				
Chloroform	1.2	0.24	40	8.0	5.3	1.1	180	37	5.3	1.1	530	110	119.38	c				
Chloromethane	94	45	3,100	1,500	390	190	13,000	6,300	390	190	39,000	19,000	50.49	n				
Dichlorodifluoromethane	100	20	3,300	670	440	88	15,000	2,900	440	88	44,000	8,800	120.91	n				
1,1-Dichloroethane (1,1-DCA)	18	4.4	600	150	77	19	2,600	630	77	19	7,700	1,900	98.96	c				
1,2-Dichloroethane (1,2-DCA)	1.1	0.27	37	9.0	4.7	1.1	160	37	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	7,300	880	220	88,000	22,000	96.94	n				
1,2-Dichloroethylene (cis and trans)	--	--	--	--	--	--	--	--	--	--	--	--	96.94	--				
Ethylbenzene	11	2.5	370	83	49	11	1,600	370	49	11	4,900	1,100	106.17	c				
Methylene Chloride	630	180	21,000	6,000	2,600	740	87,000	25,000	2,600	740	260,000	74,000	84.93	n				
Methyl Tert-Butyl Ether (MTBE)	110	30	3,700	1,000	470	130	16,000	4,300	470	130	47,000	13,000	88.15	c				
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	6.2	1,400	210	180	27	6,000	900	180	27	18,000	2,700	165.83	n				
Toluene	5,200	1,400	170,000	47,000	22,000	5,700	730,000	190,000	22,000	5,700	2,200,000	570,000	92.14	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	0.39	70	13	8.8	1.6	290	53	8.8	1.6	880	160	131.39	n				
Trichlorofluoromethane	--	--	--	--	--	--	--	--	--	--	--	--	137.37	--				
1,2,4 -Trimethylbenzene	63	13	2,100	430	260	52	8,700	1,700	260	52	26,000	5,200	120.20	n				
1,3,5- Trimethylbenzene	63	13	2,100	430	260	52	8,700	1,700	260	52	26,000	5,200	120.20	n				
Vinyl Chloride	1.7	0.65	57	22	28	11	930	370	28	11	2,800	1,100	62.50	c				
Xylene (mix)	100	23	3,300	770	440	100	15,000	3,300	440	100	44,000	10,000	106.17	n				
Xylene (n,m,o separately)	100	23	3,300	770	440	100	15,000	3,300	440	100	44,000	10,000	106.17	n				

**Notes**

All values reported to two significant digits.

-- = Inhalation toxicity values are *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

**Footnotes**

1. Quick Look-up Table only includes common contaminants. To determine the VAL and VRSL for other contaminants, refer to the steps on the next page.
2. Concentrations reported in ppbv and µg/m<sup>3</sup> are *not* equivalent for air. If comparing datasets with both units, refer to the instructions on the next page for how to convert between ppbv and µg/m<sup>3</sup>.

### STEP 1: Check if the contaminant is sufficiently volatile and toxic to pose a vapor risk:

- Open the current U.S.EPA Vapor Intrusion Screening Levels (VISLs) calculator spreadsheet: <https://www.epa.gov/vaporintrusion/vapor-intrusion-screening-levels-visls>
- Go to the worksheet titled "VISL" and scroll down to find the chemical name in the list.
- Scroll over to columns F and G to determine if the chemical is sufficiently volatile and toxic to pose an inhalation risk via vapor intrusion.
  - If no, this means the chemical does not pose an inhalation risk, and the vapor intrusion assessment may be complete for that chemical.
  - If yes, move to Step 2.

### STEP 2: Determine the indoor air Vapor Action Level (VAL)

- On the worksheet titled "VISL", choose an Exposure Scenario from the dropdown menu:
  - Select Residential for settings meeting the definition of residential in Wisc. Admin. § NR 700.03(49g).
  - Select Commercial for settings meeting definition of commercial or industrial in Wisc. Admin. § NR 700.03(39m).
- Set Target Risk for Carcinogens to 1.00 E-05 and Target Hazard Quotient for Non-Carcinogens to 1.
- Lookup the Target Indoor Air Concentration for the chemical in column H.
- Target Indoor Air Concentration = VAL.

### STEP 3: Calculate the Vapor Risk Screening Levels (VRSLs)

- Select the appropriate attenuation factor from table below:
  - Attenuation factor is based on the building type and the location where the sample was collected.
  - It is expected that the *sub-slab vapor attenuation factor* will be the default for most sampling scenarios.
- Divide each VAL by the selected attenuation factor.
- VAL/attenuation factor = VRSL.

MEDIA	ATTENUATION FACTOR	
	RESIDENTIAL OR SMALL COMMERCIAL BUILDING	INDUSTRIAL OR LARGE COMMERCIAL BUILDING
Crawl space	1	1
Sub-slab vapor	0.03	0.01
Deep soil gas	0.01	0.001
Groundwater*	0.001	0.0001

#### \* Groundwater VRSLs:

- Use the following formula to calculate the groundwater concentrations that could cause a VAL exceedance in indoor air for a compound.
- Do not use this formula for PCE and TCE. If PCE or TCE are in groundwater, use their respective Wis. Admin. Code ch. NR 140 Enforcement Standards as the vapor screening criteria.

$$C_{gw} = \frac{VAL}{H \times AF \times 1000 \text{ L/m}^3}$$

Where:

$C_{gw}$  = Groundwater Concentration ( $\mu\text{g/L}$ )

VAL = Vapor Action Level ( $\mu\text{g/m}^3$ )

AF = attenuation factor (dimensionless or unitless)

- Use *groundwater attenuation factor* in most cases, or
- Use the *sub-slab attenuation factor* if groundwater is near, or in contact with the building foundation.

H = Henry's Law constant (dimensionless)

- On the VISL spreadsheet, go to worksheet titled "Parameters Summary" and look up the Henry's law constant for the chemical.
- Or go to <https://www3.epa.gov/ceampubl/learn2model/part-two/onsite/esthenry.html>  
Input the temperature and chemical name to get Henry' law constant.

### Convert data from ppbv to $\mu\text{g/m}^3$ (if needed)

- If a vapor dataset has multiple units (ppbv and  $\mu\text{g/m}^3$ ), convert the data to a common unit of measure prior to evaluating trends or comparing values in the data.
- To convert between  $\mu\text{g/m}^3$  and ppbv, go to [http://www3.epa.gov/ceampubl/learn2model/part-two/onsite/ia\\_unit\\_conversion.html](http://www3.epa.gov/ceampubl/learn2model/part-two/onsite/ia_unit_conversion.html), or use following formula:

$$\mu\text{g/m}^3 = \frac{\text{ppbv} \times \text{MW}}{24.05}$$

Where:

MW = molecular weight (g/mole)

24.05 = conversion factor based on temperature = 20°C and pressure = 1 atm

