

WI Vapor Quick Look-Up Table ^{1, 2, 3}
Indoor Air Vapor Action Levels and Vapor Risk Screening Levels
Based on **June 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 ³	ppbV	µg/m ³	ppbV	µg/m ³	ppbV	µg/m ³	ppbV	µg/m ³	ppbV	µg/m ³	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

- Quick Look-up only includes common contaminants. If there are other contaminants of concern at a site, refer to the VISL tab on U.S. EPA's Vapor Risk Screening Level Calculator spreadsheet to see if a contaminant is *sufficiently volatile and toxic* to be a vapor intrusion risk. <https://www.epa.gov/vaporintrusion/vapor-intrusion-screening-levels-visls>
- To determine the VAL and VRSL for other volatile contaminants that are not listed in the Quick Look-up table, refer to the steps on page 2.
- Concentrations reported in ppbv and µg/m³ are *not* equivalent for air. Refer to the instructions on page 2 for how to convert between these units, if needed for a comparing datasets.

STEP 1: Determine indoor air Vapor Action Level (VAL)

- Get U.S.EPA RSL tables for indoor air at <https://www.epa.gov/risk/regional-screening-levels-rsls>
 - Click on Generic Tables
 - Use *Resident Air* table under column labeled $TR=1E-06$ $THQ=0.1$ for residential setting per Wisc. Admin. § NR 700.03(49g).
 - Use *Composite Worker Air* table under column labeled $TR=1E-06$ $THQ=0.1$ for commercial or industrial setting per Wisc. Admin. § NR 700.03(39m).
- Lookup the U.S EPA RSL for each compound in the tables. If compound has both a carcinogenic target risk and a noncancer hazard index, *pick the smaller of the two values.*
- Multiply the selected U.S EPA RSL by 10 to convert to risk levels used in Wisconsin, which are carcinogenic target risk = 10^{-5} and noncancer hazard index = 1.
- *The resulting values are the indoor air VALs that apply to sites in Wisconsin.*

STEP 2: Calculate the Vapor Risk Screening Levels (VRSLs)

- Use the attenuation factor to convert from the VAL to the VRSL for a compound.
- Select the attenuation factor based on building type and location where sample was collected. (*It is expected that most VRSLs will be for sub-slab vapor samples.*)
- Divide each VAL by the selected attenuation factor ($VRSL = VAL/attenuation\ factor$).
- *The resulting values are the default VRSLs and are used to evaluate if measured concentrations in the environment are a potential vapor risk to a specific building type.*

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 for PCE and TCE.* To screen for vapor risk when PCE or TCE are in groundwater, use their respective Wis. Admin. § NR 140 Enforcement Standard.

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

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

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

AF = attenuation factor (dimensionless)

- 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)

- Go to <https://www3.epa.gov/ceampubl/learn2model/part-two/onsite/esthenry.html>

Input the temperature and chemical name to get Henry's law constant.

- Or go to <https://www.epa.gov/risk/regional-screening-levels-rsls>

Click on Generic Tables, select Chemical Specific Parameters, and look up Henry's law constant for the compound.

IF NEEDED: Convert data from ppbv to $\mu\text{g/m}^3$

- If lab data is reported in ppbv, a conversion is required to change units from ppbv to $\mu\text{g/m}^3$ so you can compare to lab data to the VRSL.
- 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, 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