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

CHEMICAL	RESIDENTIAL AF = 0.03				SMALL COMMERICAL AF = 0.03				LARGE COMMERCIAL/INDUSTRIAL AF = 0.01				MOLECULAR WEIGHT	U.S.EPA RSL BASIS
	INDOOR AIR VAL		SUB-SLAB VAPOR VRSL		INDOOR AIR VAL		SUB-SLAB VAPOR VRSL		INDOOR AIR VAL		SUB-SLAB VAPOR VRSL			
	µg/m³	ppbV	µg/m³	ppbV	µg/m³	ppbV	µg/m³	ppbV	µg/m³	ppbV	µg/m³	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
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
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
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
Trichlorofluromethane	--	--	--	--	--	--	--	--	--	--	--	--	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

Immediate Action Criteria for Indoor Air: carcinogens (c) = 10 x VAL; non-carcinogens (n) = 3 x VAL

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/m³ 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/m³.

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.

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

Where:
C_{gw} = Groundwater Concentration (µg/L)
VAL = Vapor Action Level (µg/m³)
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 µg/m³ (if needed)

- If a vapor dataset has multiple units (ppbv and µg/m³), convert the data to a common unit of measure prior to evaluating trends or comparing values in the data.
- To convert between µg/m³ and ppbv, go to http://www3.epa.gov/ceampubl/learn2model/part-two/onsite/ia_unit_conversion.html , or use following formula:

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

Where:
MW = molecular weight (g/mole)
24.05 = conversion factor based on temperature = 20°C and pressure = 1 atm