Wisconsin Department of Natural Resources

Remediation and Redevelopment Program

Issues & Trends 2015

July 29, 2015

12:00 p.m. – 1:00 p.m.

Dial: 1-855-947-8255

Passcode: 6612 745#

Questions will be taken during the presentation or can be submitted to DNRRRComments@wisconsin.gov

Sub-slab Vapor Attenuation Factors and U.S. EPA Vapor Intrusion Guidance

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Final U.S. EPA VI Guidance

- Final EPA VI Guidance:

http://www.epa.gov/oswer/vaporintrusion/

- New attenuation factors (AF) based on
  - Expanded EPA database
  - Reevaluation of original data

Compare U.S. EPA Attenuation Factors – 2002 and 2015

Media to Indoor Air	2002 EPA AF	2015 EPA AF	Note
Groundwater	0.001	0.001	≥ 5 feet between foundation and groundwater
Sub-slab Vapor	0.1	0.03	
Shallow exterior soil gas	0.1	NA	Shallow exterior soil gas NOT recommended for estimating IA
Near-source soil gas	0.01	0.03	Soil gas collected near the vapor source
Crawl Space	1	1	
95th percentile of "source-screened" media. Majority of buildings will exhibit lower air concentrations			

Caveats to Estimating VI Risk from AF

- Multiple samples to characterize spatial & temporal variability
- Multiple lines of evidence
- Weigh all information together

Nonresidential Buildings

- U.S. EPA recommends same AF for nonresidential and residential buildings
- Provides considerations to support lower AF in large nonresidential buildings:
  - Building size (height & footprint area)
  - Air exchange rate
  - Slab thickness

EPA RSL Table and VALs

- http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/Generic_Tables/index.htm

You will need the free Adobe Reader to view some of the files on this page. See EPA's PDF page to learn more.				
	TR=1E-06 and THQ=1.0		TR=1E-06 and THQ=0.1	
	(TR=1E-06 THQ=1.0)	(TR=1E-06 THQ=1.0)	(TR=1E-06 THQ=0.1)	(TR=1E-06 THQ=0.1)
Summary Table	(PDF)	XLS	(PDF)	XLS
Residential Soil	(PDF)	XLS	(PDF)	XLS
Industrial Soil	(PDF)	XLS	(PDF)	XLS
Residential Air	(PDF)	XLS	(PDF)	XLS
Industrial Air	(PDF)	XLS	(PDF)	XLS
Residential Tapwaters	(PDF)	XLS	(PDF)	XLS

Select the appropriate table (residential or industrial air)
Multiply **every value by 10** (cancer & non-cancer endpoints)
The smaller of the two values = the WI indoor air vapor action level

EPA RSL Table and VALs

Regional Screening Level (RSL) Composite Worker Ambient Air Table (TR=1E-6, HQ=0.1) June 2015

DR; C = Cal EPA; X = APPENDIX PPRTV SCREEN (See FAQ #27); H = HEAST; J = New Jersey; O = EPA Office of Water; F = See FAQ; E = Environmental Criteria and ide Section 5; L = see user guide on lead; M = mutagen; V = volatile; R = RBA applied (See User Guide for Arsenic notice) ; c = cancer; * = where: n SL < 100X c SL; ** = noncancer; m = Concentration may exceed ceiling limit (See User Guide); s = Concentration may exceed Csat (See User Guide); SSL values are based on DAF=1

Contaminant		Carcinogenic Target Risk (TR) = 1E-06	Noncancer Hazard Index (HI) = 0.1
Analyte	CAS No.	Carcinogenic SL TR=1.0E-6 (ug/m^3)	Noncarcinogenic SL HI=0.1 ($\mu g/m^3$)
Benzene	71-43-2	1.6E+00	1.3E+01
Benzenediamine-2-methyl sulfate, 1,4-	6369-59-1		
Benzenethiol	108-98-5		

X 10 X 10

16 $\mu g/m^3$ 130 $\mu g/m^3$

Smaller value = VAL

Calculating Sub-slab VRSL for any VOC

- Sub-slab Vapor Risk Screening Level:

$$\text{SS VRSL} = \text{VAL}/\text{AF}$$

  - VAL = vapor action level (indoor air)
  - AF = attenuation factor

New Sub-slab VRSL Table

Chemical	Residential				Small Commercial				Large Commercial/Industrial			
	Attenuation Factor = 0.03				Attenuation Factor = 0.03				Attenuation Factor = 0.01			
	VAL µg/m^3	SS VRSL µg/m3	VAL ppbV	SS VRSL ppbV	VAL µg/m^3	SS VRSL µg/m3	VAL ppbV	SS VRSL ppbV	VAL µg/m^3	SS VRSL µg/m3	VAL ppbV	SS VRSL ppbV
Benzene	3.6	120	1.1	36	16	533	4.9	163	16	1,600	4.9	490
Carbon Tetrachloride	4.7	156	0.73	24	20	666	3.1	103	20	2,000	3.1	310
Chloroform	1.2	40	0.24	8	5.3	176	1.1	36	5.3	530	1.1	110
Chloromethane	94	3,133	45	1,500	390	13,000	190	6,333	390	39,000	190	19,000
Dichlorodifluoromethane	100	3,333	20	666	440	14,666	88	2,933	440	44,000	88	8,800
1,1 – Dichloroethane (1,1-DCA)	18	600	4.4	146	77	2,566	19	633	77	7,700	19	1,900
1,2-Dichloroethane (1,2-DCA)	1.1	36	0.27	9	4.7	156	1.1	36	4.7	470	1.1	110
1,1 -Dichloroethylene (1,1-DCE)	210	7,000	52	1,733	880	29,333	220	7,333	880	88,000	220	22,000
1,2-Dichloroethylene (cis and mixed)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloroethylene (trans)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ethylbenzene	11	366	2.5	83	49	1633	11	366	49	4,900	11	1,100
Methylene Chloride	630	21,000	180	6,000	2,600	86,666	740	24,666	2,600	260,000	740	74,000
Methyl Tert-Butyl Ether (MTBE)	110	3,666	30	1,000	470	15,666	130	4,333	470	47,000	130	13,000
Naphthalene	0.83	27	0.16	5	3.6	120	0.68	22	3.6	360	0.68	68
Tetrachloroethylene	42	1,400	6.2	206	180	6,000	27	900	180	18,000	27	2,700
Toluene	5,200	173,333	1,400	46,666	22,000	733,333	5,700	190,000	22,000	2,200,000	5,700	570,000
1,1,1 - Trichloroethane	5,200	173,333	940	31,333	22,000	733,333	4,000	133,333	22,000	2,200,000	4,000	400,000
Trichloroethylene	2.1	70	0.39	13	8.8	293	1.6	53	8.8	880	1.6	160
Trichlorofluromethane (Halocarbon 11)	730	24,300	130	4,333	3,100	103,333	540	18,000	3,100	310,000	540	54,000
Trimethylbenzene (1,2,4)	7.3	243	1.5	50	31	1,033	6.2	206	31	3,100	6.2	620
Trimethylbenzene (1,3,5)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vinyl Chloride	1.7	57	0.65	21	28	933	11	366	28	2,800	11	1,100
Xylene (mix)	100	3,333	23	766	440	14,666	100	3,333	440	44,000	100	10,000
Xylene (n,m,o separately)	100	3,333	23	766	440	14,666	100	3,333	440	44,000	100	10,000

Common Questions

- How is “large” defined for determining the applicable AF?
- Can a building specific AF be used?
- Are the VOCs in the Quick Look-up Tables the only ones DNR cares about?
- Do I need to test for the full TO-15 analyte list?
- Will DNR consider averaging sub-slab vapor concentrations?

VI Continuing Obligations Documents in Progress

- Revisions being reviewed for:
  - RR-042, DNR Case Closure Continuing Obligations: Vapor Intrusion
  - RR-5474, Vapor Intrusion Continuing Obligations Applied in DNR Closure Approvals

VI Continuing Obligations Documents

- Updates include:
  - Added: Ventilated parking garages and other engineered systems to address vapor intrusion
  - Broadens systems accepted for addressing VI into current or future buildings


Questions

Issues & Trends 2015

August 5, 2015
12:00 – 1:00 p.m.

Navigating the Voluntary Party Liability Exemption (VPLE) program

Audio from today's presentation and information about this and future *Issues & Trends Series* can be found on the RR Program Training Webpage at:
dnr.wi.gov/topic/Brownfields/Training.html

Questions / Comments / Suggestions regarding the Issues & Trends Series can be submitted to:

DNRRRComments@wisconsin.gov

Thank you