From:	Evans, Charlotte [Cevans@craworld.com]
Sent:	Wednesday, March 17, 2010 10:54 AM
To:	Detterman, Mark, Env. Health
Subject:	RE: RO 143 / Harrison St - Risk Assessment - A Couple of Questions
Attachments:	9-0020 Risk Tables - Shallow Soil.pdf; 9-0020 Risk Tables - Deep Soil.pdf

Hi Mark,

Here are the responses to your questions:

Is there a reason that an adult non-cancer hazard was not calculated? Typically it is both that I've seen before. Only the child was calculated (while both adult and child cancer risks were calculated for the letter report). This is a question, not a request (at this point).

Hazard evaluation of a potential child resident receptor, i.e., estimation of noncancer hazard, is more conservative for child residents than adult residents. By nature of the way hazard indices are calculated, the lower average body weight and exposure duration for children always result in a hazard index equal to or higher than that that would be calculated for an adult resident. This would not impact the conclusions of the assessment.

I also noticed that the "data entry sheet" and the "intermediate calculations sheet" for the TPH portion of the calcs were not included in the attachment. And there's a similar issue for all the deep soil calculations. I presume both should be? (A side question, do the "intermediate" sheets allow for use input, or are they program calculations?)

Originally, the TPH fraction tables were not included (an oversight), but are now attached. The correct pages that should have been included from the SG-SCREEN model in the assessment are the "DATAENTER" and "INTERCALCS" pages. In general, the "DATAENTER" page contains all of the site-specific input values including among others: COPC, concentration of COPC in soil gas, depth below grade to bottom of enclosed space floor, soil gas sampling depth below grade, soil type and soil parameters. The "INTERCALCS" page provides the predicted indoor air concentration (infinite source building concentration) based on the site-specific input parameters entered into the spreadsheet. The infinite source building concentration (from the "INTERCALCS" page) was post-processed in a separate risk/hazard spreadsheet that is more transparent by providing the exact exposure parameters that were used in the assessment (Table 3), and the most recent toxicity criteria that were used (in this case from the CalEPA OEHHA Toxicity Criteria Database and USEPA Integrated Risk Information System as shown in Table 4). This is a typical approach used by risk assessors.

And finally the "Exposure Frequency" input looks to be 250 days and not 350 days as cited in Table 3 (in this and the Dec 30th report). With luck these were just the wrong printouts? Guess I shoulda noted this earlier…

Use of the 350 days/year and 30 years for noncancer averaging time and exposure duration does not impact the infinite source building concentration. They are independent of each other. As it stands, the estimates presented in Tables 5 and 6 are correct. To avoid confusion, attached are all revised tables with the resident exposure parameters inserted. This will not impact the conclusions of the assessment.

If you would like me to resubmit the Revised Risk Assessment, I can. Or let me know if you have any additional questions.

Thanks.

_____

Charlotte Evans
Conestoga-Rovers & Associates (CRA)

From: Detterman, Mark, Env. Health [mailto:Mark.Detterman@acgov.org]
Sent: Friday, March 12, 2010 11:33 AM
To: Evans, Charlotte
Subject: RO 143 / Harrison St - Risk Assessment - A Couple of Questions

Hi Charlotte,

I was trying to do a speedy review of your recent submittal, but ran into a few questions. Hopefully they are somewhat simple to respond to, but they may not be.

Is there a reason that an adult non-cancer hazard was not calculated? Typically it is both that I've seen before. Only the child was calculated (while both adult and child cancer risks were calculated for the letter report). This is a question, not a request (at this point).

I also noticed that the "data entry sheet" and the "intermediate calculations sheet" for the TPH portion of the calcs were not included in the attachment. And there's a similar issue for all the deep soil calculations. I presume both should be? (A side question, do the "intermediate" sheets allow for use input, or are they program calculations?)

And finally the "Exposure Frequency" input looks to be 250 days and not 350 days as cited in Table 3 (in this and the Dec 30th report). With luck these were just the wrong printouts? Guess I shoulda noted this earlier…

Hopefully these are just simple oversights. Let me know what you find; you might initially just email the items here for a quicker review, but then ultimately put together a revised risk assessment (once we both figure the best route forward)? Thanks,

Mark Detterman
Hazardous Materials Specialist, PG, CEG
Alameda County Environmental Health
1131 Harbor Bay Parkway
Alameda, CA 94502
Direct: 510.567.6876
Fax: 510.337.9335
Email: mark.detterman@acgov.org

PDF copies of case files can be downloaded at:

http://www.acgov.org/aceh/lop/ust.htm

Table A-1. Maximum Benzene Shallow Soil Vapor Concentration

| SG-SCREEN |
| PA Version 2.0; 04/ |

| Reset to Defaults |

DTSC

Vapor Intrusion Guidance

Interim Final 12/04

(last modified 2/4/09)

Soil Gas Concentration Data

ENTER	**ENTER**		**ENTER**	
Chemical CAS No. (numbers only, no dashes)	Soil gas conc., C_g ($\mu g/m^3$)	OR	Soil gas conc., C_g (ppmv)	Chemical
71432	3.70E+01			Benzene

| **MORE** ↓ | **ENTER** Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm) | **ENTER** Soil gas sampling depth below grade, L_s (cm) | **ENTER** Average soil temperature, T_S (^oC) | **ENTER** Vadose zone SCS soil type (used to estimate soil vapor permeability) | OR | **ENTER** User-defined vadose zone soil vapor permeability, k_v (cm^2) |
| | 15 | 152.4 | 24 | S | | |

| **MORE** ↓ | **ENTER** Vandose zone SCS soil type [Lookup Soil Parameters] | **ENTER** Vadose zone soil dry bulk density, ρ_b^A (g/cm^3) | **ENTER** Vadose zone soil total porosity, n^V (unitless) | **ENTER** Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3) | **ENTER** Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m) |
| | S | 1.83 | 0.324 | 0.279 | 5 |

| **MORE** ↓ | **ENTER** Averaging time for carcinogens, AT_C (yrs) | **ENTER** Averaging time for noncarcinogens, AT_{NC} (yrs) | **ENTER** Exposure duration, ED (yrs) | **ENTER** Exposure frequency, EF (days/yr) |
| | 70 | 30 | 30 | 350 |

| **END** |

Tables A-1 and A-2 Benzene

3/17/2010

9:31 AM

Table A-2. Maximum Benzene Shallow Soil Vapor Concentration

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone soil effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Floor-wall seam perimeter, X_{crack} (cm)	Soil gas conc. (μg/m^3)	Bldg. ventilation rate, $Q_{building}$ (cm^3/s)
137.4	0.045	0.834	1.02E-07	0.055	5.62E-09	4,000	3.70E+01	3.39E+04

Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Diffusion path length, L_d (cm)
1.00E+06	5.00E-03	15	7,977	5.29E-03	2.17E-01	1.80E-04	3.36E-05	137.4

Convection path length, L_p (cm)	Source vapor conc., C_{source} (μg/m^3)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ (μg/m^3)
15	3.70E+01	1.25	8.33E+01	3.36E-05	5.00E+03	#NUM!	7.19E-06	2.66E-04

Unit risk factor, URF (μg/m^3)$^{-1}$	Reference conc., RfC (mg/m^3)
2.9E-05	3.0E-02

END

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Tables A-1 and A-2 Benzene
3/17/2010
9:31 AM

Table A-3. Maximum Chloroform Shallow Soil Vapor Concentration

SG-SCREEN PA Version 2.0; 04/

Reset to Defaults

DTSC

Vapor Intrusion Guidance
Interim Final 12/04
(last modified 2/4/09)

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g ($\mu g/m^3$)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
67663	1.00E+01			Chloroform

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Soil gas sampling depth below grade, L_s (cm)	ENTER Average soil temperature, T_S (^{o}C)	ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	152.4	24	S		

MORE ↓

ENTER Vandose zone SCS soil type (Lookup Soil Parameters)	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
S	1.83	0.324	0.279	5

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
70	30	30	350

END

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Unclassified Soil Screening Model

Tables A-3 and A-4 Chloroform
3/17/2010
9:32 AM

Table A-4. Maximum Chloroform Shallow Soil Vapor Concentration

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm³/cm³)	Vadose zone soil effective total fluid saturation, S_{te} (cm³/cm³)	Vadose zone soil intrinsic permeability, k_i (cm²)	Vadose zone soil relative air permeability, k_{rg} (cm²)	Vadose zone soil effective vapor permeability, k_v (cm²)	Floor-wall seam perimeter, X_{crack} (cm)	Soil gas conc. (µg/m³)	Bldg. ventilation rate, $Q_{building}$ (cm³/s)
137.4	0.045	0.834	1.02E-07	0.055	5.62E-09	4,000	1.00E+01	3.39E+04

Area of enclosed space below grade, A_B (cm²)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} (atm-m³/mol)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm²/s)	Diffusion path length, L_d (cm)
1.00E+06	5.00E-03	15	7,407	3.51E-03	1.44E-01	1.80E-04	4.19E-05	137.4

Convection path length, L_p (cm)	Source vapor conc., C_{source} (µg/m³)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm³/s)	Crack effective diffusion coefficient, D^{crack} (cm²/s)	Area of crack, A_{crack} (cm²)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ (µg/m³)
15	1.00E+01	1.25	8.33E+01	4.19E-05	5.00E+03	#NUM!	8.96E-06	8.96E-05

Unit risk factor, URF (µg/m³)⁻¹	Reference conc., RfC (mg/m³)
5.3E-06	3.0E-01

END

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Last Update: 11/1/03

DTSC Indoor Air Guidance
Unclassified Soil Screening Model

Tables A-3 and A-4 Chloroform
3/17/2010
9:32 AM

Table A-5. Maximum Ethylbenzene Shallow Soil Vapor Concentration

SG-SCREEN
PA Version 2.0; 04/

Reset to
Defaults

DTSC

Vapor Intrusion Guidance
Interim Final 12/04
(last modified 2/4/09)

Soil Gas Concentration Data

ENTER	**ENTER**		**ENTER**	
Chemical	Soil		Soil	
CAS No.	gas	OR	gas	
(numbers only,	conc.,		conc.,	
	C_g		C_g	
no dashes)	$(\mu g/m^3)$		(ppmv)	Chemical
100414	1.70E+02			Ethylbenzene

	ENTER	**ENTER**	**ENTER**	**ENTER**		**ENTER**
MORE ↓	Depth below grade to bottom of enclosed space floor,	Soil gas sampling depth below grade,	Average soil temperature,	Vadose zone SCS soil type (used to estimate soil vapor	OR	User-defined vadose zone soil vapor permeability,
	L_F	L_s	T_S	permeability)		k_v
	(15 or 200 cm)	(cm)	(^{o}C)			(cm^2)
	15	152.4	24	S		

	ENTER	**ENTER**	**ENTER**	**ENTER**	**ENTER**
MORE ↓	Vandose zone SCS soil type	Vadose zone soil dry bulk density,	Vadose zone soil total porosity,	Vadose zone soil water-filled porosity,	Average vapor flow rate into bldg. (Leave blank to calculate)
	Lookup Soil Parameters	ρ_b^A	n^V	θ_w^V	Q_{soil}
		(g/cm^3)	(unitless)	(cm^3/cm^3)	(L/m)
	S	1.83	0.324	0.279	5

	ENTER	**ENTER**	**ENTER**	**ENTER**
MORE ↓	Averaging time for carcinogens,	Averaging time for noncarcinogens,	Exposure duration,	Exposure frequency,
	AT_C	AT_{NC}	ED	EF
	(yrs)	(yrs)	(yrs)	(days/yr)
	70	30	30	350

END

Tables A-5 and A-6 Ethylbenzene
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9:32 AM

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Unclassified Soil Screening Model

INTERMEDIATE CALCULATIONS SHEET

Table A-6. Maximum Ethylbenzene Shallow Soil Vapor Concentration

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, $\theta_a{}^V$ (cm³/cm³)	Vadose zone soil effective total fluid saturation, S_{te} (cm³/cm³)	Vadose zone soil intrinsic permeability, k_i (cm²)	Vadose zone soil relative air permeability, k_{rg} (cm²)	Vadose zone soil effective vapor permeability, k_v (cm²)	Floor-wall seam perimeter, X_{crack} (cm)	Soil gas conc. (µg/m³)	Bldg. ventilation rate, $Q_{building}$ (cm³/s)
137.4	0.045	0.834	1.02E-07	0.055	5.62E-09	4,000	1.70E+02	3.39E+04

Area of enclosed space below grade, A_B (cm²)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} (atm-m³/mol)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, $D^{eff}{}_V$ (cm²/s)	Diffusion path length, L_d (cm)
1.00E+06	5.00E-03	15	9,994	7.43E-03	3.05E-01	1.80E-04	2.69E-05	137.4

Convection path length, L_p (cm)	Source vapor conc., C_{source} (µg/m³)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm³/s)	Crack effective diffusion coefficient, D^{crack} (cm²/s)	Area of crack, A_{crack} (cm²)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ (µg/m³)
15	1.70E+02	1.25	8.33E+01	2.69E-05	5.00E+03	#NUM!	5.76E-06	9.79E-04

Unit risk factor, URF (µg/m³)⁻¹	Reference conc., RfC (mg/m³)
2.5E-06	1.0E+00

END

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Last Update: 11/1/03

DTSC Indoor Air Guidance
Unclassified Soil Screening Model

Tables A-5 and A-6 Ethylbenzene
3/17/2010
9:33 AM

Table A-7. Maximum Naphthalene Shallow Soil Vapor Concentration

| SG-SCREEN |
| PA Version 2.0; 04/ |

| Reset to Defaults |

DTSC

Vapor Intrusion Guidance
Interim Final 12/04
(last modified 2/4/09)

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	**ENTER** Soil gas conc., C_g ($\mu g/m^3$)	OR	**ENTER** Soil gas conc., C_g (ppmv)	Chemical
91203	1.10E+02			Naphthalene

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	**ENTER** Soil gas sampling depth below grade, L_s (cm)	**ENTER** Average soil temperature, T_S (^oC)	**ENTER** Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	**ENTER** User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	152.4	24	S		

MORE ↓

ENTER Vandose zone SCS soil type [Lookup Soil Parameters]	**ENTER** Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	**ENTER** Vadose zone soil total porosity, n^V (unitless)	**ENTER** Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)	**ENTER** Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
S	1.83	0.324	0.279	5

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	**ENTER** Averaging time for noncarcinogens, AT_{NC} (yrs)	**ENTER** Exposure duration, ED (yrs)	**ENTER** Exposure frequency, EF (days/yr)
70	30	30	350

END

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Last Update: 11/1/03

DTSC Indoor Air Guidance
Unclassified Soil Screening Model

Tables A-7 and A-8 Naphthalene
3/17/2010
9:33 AM

Table A-8. Maximum Naphthalene Shallow Soil Vapor Concentration

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm³/cm³)	Vadose zone soil effective total fluid saturation, S_{te} (cm³/cm³)	Vadose zone soil intrinsic permeability, k_i (cm²)	Vadose zone soil relative air permeability, k_{rg} (cm²)	Vadose zone soil effective vapor permeability, k_v (cm²)	Floor-wall seam perimeter, X_{crack} (cm)	Soil gas conc. (μg/m³)	Bldg. ventilation rate, $Q_{building}$ (cm³/s)
137.4	0.045	0.834	1.02E-07	0.055	5.62E-09	4,000	1.10E+02	3.39E+04

Area of enclosed space below grade, A_B (cm²)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} (atm-m³/mol)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm²/s)	Diffusion path length, L_d (cm)
1.00E+06	5.00E-03	15	12,768	4.48E-04	1.84E-02	1.80E-04	7.38E-05	137.4

Convection path length, L_p (cm)	Source vapor conc., C_{source} (μg/m³)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm³/s)	Crack effective diffusion coefficient, D^{crack} (cm²/s)	Area of crack, A_{crack} (cm²)	Exponent of equivalent foundation Peclet number, $exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ (μg/m³)
15	1.10E+02	1.25	8.33E+01	7.38E-05	5.00E+03	#NUM!	1.58E-05	1.73E-03

Unit risk factor, URF (μg/m³)⁻¹	Reference conc., RfC (mg/m³)
3.4E-05	3.0E-03

END

DTSC / HERD
Last Update: 11/1/03

DTSC Indoor Air Guidance
Unclassified Soil Screening Model

Tables A-7 and A-8 Naphthalene
3/17/2010
9:33 AM

Table A-9. Maximum Toluene Shallow Soil Vapor Concentration

SG-SCREEN
PA Version 2.0; 04/

Reset to
Defaults

DTSC

Vapor Intrusion Guidance
Interim Final 12/04
(last modified 2/4/09)

Soil Gas Concentration Data

ENTER	ENTER		ENTER	
Chemical	Soil		Soil	
CAS No.	gas	OR	gas	
(numbers only,	conc.,		conc.,	
	C_g		C_g	
no dashes)	$(\mu g/m^3)$		(ppmv)	Chemical
108883	6.00E+02			Toluene

	ENTER	ENTER	ENTER	ENTER		ENTER
MORE ↓	Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	Soil gas sampling depth below grade, L_s (cm)	Average soil temperature, T_S (^{o}C)	Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	User-defined vadose zone soil vapor permeability, k_v (cm^2)
	15	152.4	24	S		

	ENTER	ENTER	ENTER	ENTER	ENTER
MORE ↓	Vandose zone SCS soil type	Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	Vadose zone soil total porosity, n^V (unitless)	Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)	Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
	Lookup Soil Parameters				
	S	1.83	0.324	0.279	5

	ENTER	ENTER	ENTER	ENTER
MORE ↓	Averaging time for carcinogens, AT_C (yrs)	Averaging time for noncarcinogens, AT_{NC} (yrs)	Exposure duration, ED (yrs)	Exposure frequency, EF (days/yr)
	70	30	30	350

END

Tables A-9 and A-10 Toluene
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DTSC Indoor Air Guidance
Unclassified Soil Screening Model

Table A-10. Maximum Toluene Shallow Soil Vapor Concentration

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm³/cm³)	Vadose zone effective total fluid saturation, S_{te} (cm³/cm³)	Vadose zone soil intrinsic permeability, k_i (cm²)	Vadose zone soil relative air permeability, k_{rg} (cm²)	Vadose zone soil effective vapor permeability, k_v (cm²)	Floor-wall seam perimeter, X_{crack} (cm)	Soil gas conc. (µg/m³)	Bldg. ventilation rate, $Q_{building}$ (cm³/s)
137.4	0.045	0.834	1.02E-07	0.055	5.62E-09	4,000	6.00E+02	3.39E+04

Area of enclosed space below grade, A_B (cm²)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} (atm-m³/mol)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm²/s)	Diffusion path length, L_d (cm)
1.00E+06	5.00E-03	15	9,001	6.29E-03	2.58E-01	1.80E-04	3.17E-05	137.4

Convection path length, L_p (cm)	Source vapor conc., C_{source} (µg/m³)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm³/s)	Crack effective diffusion coefficient, D^{crack} (cm²/s)	Area of crack, A_{crack} (cm²)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ (µg/m³)
15	6.00E+02	1.25	8.33E+01	3.17E-05	5.00E+03	#NUM!	6.78E-06	4.07E-03

Unit risk factor, URF (µg/m³)⁻¹	Reference conc., RfC (mg/m³)
NA	3.0E-01

END

DTSC / HERD
Last Update: 11/1/03

DTSC Indoor Air Guidance
Unclassified Soil Screening Model

Tables A-9 and A-10 Toluene
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9:34 AM

Table A-11. Maximum Xylenes Soil Vapor Concentration

SG-SCREEN
PA Version 2.0; 04/

Reset to
Defaults

DTSC

Vapor Intrusion Guidance
Interim Final 12/04
(last modified 2/4/09)

Soil Gas Concentration Data

ENTER	ENTER		ENTER	
Chemical	Soil	OR	Soil	
CAS No.	gas		gas	
(numbers only,	conc.,		conc.,	
no dashes)	C_g		C_g	
	$(\mu g/m^3)$		(ppmv)	Chemical
106423	5.30E+02			p-Xylene

MORE ↓

ENTER	ENTER	ENTER	ENTER		ENTER
Depth			Vadose zone		User-defined
below grade	Soil gas		SCS		vadose zone
to bottom	sampling	Average	soil type		soil vapor
of enclosed	depth	soil	(used to estimate	OR	permeability,
space floor,	below grade,	temperature,	soil vapor		k_v
L_F	L_s	T_S	permeability)		
(15 or 200 cm)	(cm)	(^oC)			(cm^2)
15	152.4	24	S		

MORE ↓

ENTER	ENTER	ENTER	ENTER	ENTER
Vandose zone	Vadose zone	Vadose zone	Vadose zone	Average vapor
SCS	soil dry	soil total	soil water-filled	flow rate into bldg.
soil type	bulk density,	porosity,	porosity,	(Leave blank to calculate)
Lookup Soil Parameters	ρ_b^A	n^V	θ_w^V	Q_{soil}
	(g/cm^3)	(unitless)	(cm^3/cm^3)	(L/m)
S	1.83	0.324	0.279	5

MORE ↓

ENTER	ENTER	ENTER	ENTER
Averaging	Averaging		
time for	time for	Exposure	Exposure
carcinogens,	noncarcinogens,	duration,	frequency,
AT_C	AT_{NC}	ED	EF
(yrs)	(yrs)	(yrs)	(days/yr)
70	30	30	350

END

Tables A-11 and A-12 Xylenes
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9:34 AM

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Table A-12. Maximum Xylenes Soil Vapor Concentration

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, $\theta_a{}^V$ (cm^3/cm^3)	Vadose zone soil effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Floor-wall seam perimeter, X_{crack} (cm)	Soil gas conc. (μg/m^3)	Bldg. ventilation rate, $Q_{building}$ (cm^3/s)
137.4	0.045	0.834	1.02E-07	0.055	5.62E-09	4,000	5.30E+02	3.39E+04

Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, $D^{eff}{}_V$ (cm^2/s)	Diffusion path length, L_d (cm)
1.00E+06	5.00E-03	15	10,083	7.22E-03	2.96E-01	1.80E-04	2.79E-05	137.4

Convection path length, L_p (cm)	Source vapor conc., C_{source} (μg/m^3)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ (μg/m^3)
15	5.30E+02	1.25	8.33E+01	2.79E-05	5.00E+03	#NUM!	5.97E-06	3.16E-03

Unit risk factor, URF (μg/m^3)$^{-1}$	Reference conc., RfC (mg/m^3)
NA	1.0E-01

END

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Tables A-11 and A-12 Xylenes
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Table A-13. Maximum Hexane (C5-C8 Aliphatics) Soil Vapor Concentration

SG-SCREEN
PA Version 2.0; 04/

DTSC

Vapor Intrusion Guidance
Interim Final 12/04
(last modified 2/4/09)

Reset to
Defaults

Soil Gas Concentration Data

ENTER	ENTER		ENTER	
Chemical	Soil		Soil	
CAS No.	gas	OR	gas	
(numbers only,	conc.,		conc.,	
no dashes)	C_g		C_g	
	$(\mu g/m^3)$		(ppmv)	Chemical
110543	1.28E+04			Hexane

	ENTER	ENTER	ENTER	ENTER		ENTER
MORE ↓	Depth below grade to bottom of enclosed space floor, L_F	Soil gas sampling depth below grade, L_s	Average soil temperature, T_S	Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	User-defined vadose zone soil vapor permeability, k_v
	(15 or 200 cm)	(cm)	(^oC)			(cm^2)
	15	152.4	24	S		

	ENTER	ENTER	ENTER	ENTER	ENTER
MORE ↓	Vandose zone SCS soil type	Vadose zone soil dry bulk density, ρ_b^A	Vadose zone soil total porosity, n^V	Vadose zone soil water-filled porosity, θ_w^V	Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil}
	Lookup Soil Parameters	(g/cm^3)	(unitless)	(cm^3/cm^3)	(L/m)
	S	1.83	0.324	0.279	5

	ENTER	ENTER	ENTER	ENTER
MORE ↓	Averaging time for carcinogens, AT_C	Averaging time for noncarcinogens, AT_{NC}	Exposure duration, ED	Exposure frequency, EF
	(yrs)	(yrs)	(yrs)	(days/yr)
	70	30	30	350

END

Tables A-13 and A-14 Hexane C5-C8
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Table A-14. Maximum Hexane (C5-C8 Aliphatics) Soil Vapor Concentration

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone soil effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Floor-wall seam perimeter, X_{crack} (cm)	Soil gas conc. (μg/m^3)	Bldg. ventilation rate, $Q_{building}$ (cm^3/s)
137.4	0.045	0.834	1.02E-07	0.055	5.62E-09	4,000	1.28E+04	3.39E+04

Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Diffusion path length, L_d (cm)
1.00E+06	5.00E-03	15	7,549	1.59E+00	6.53E+01	1.80E-04	6.24E-05	137.4

Convection path length, L_p (cm)	Source vapor conc., C_{source} (μg/m^3)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ (μg/m^3)
15	1.28E+04	1.25	8.33E+01	6.24E-05	5.00E+03	#NUM!	1.33E-05	1.71E-01

Unit risk factor, URF (μg/m^3)$^{-1}$	Reference conc., RfC (mg/m^3)
NA	7.0E-01

END

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Tables A-13 and A-14 Hexane C5-C8
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DATA ENTRY SHEET

Table A-15. Maximum Toluene (C9-C18 Aliphatics) Shallow Soil Vapor Concentration

SG-SCREEN
PA Version 2.0; 04/

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Vapor Intrusion Guidance
Interim Final 12/04
(last modified 2/4/09)

Reset to Defaults

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	**ENTER** Soil gas conc., C_g ($\mu g/m^3$)	OR	**ENTER** Soil gas conc., C_g (ppmv)	Chemical
108883	1.28E+04			Toluene

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	**ENTER** Soil gas sampling depth below grade, L_s (cm)	**ENTER** Average soil temperature, T_S (^oC)	**ENTER** Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	**ENTER** User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	152.4	24	S		

MORE ↓

ENTER Vandose zone SCS soil type (Lookup Soil Parameters)	**ENTER** Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	**ENTER** Vadose zone soil total porosity, n^V (unitless)	**ENTER** Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)	**ENTER** Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
S	1.83	0.324	0.279	5

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	**ENTER** Averaging time for noncarcinogens, AT_{NC} (yrs)	**ENTER** Exposure duration, ED (yrs)	**ENTER** Exposure frequency, EF (days/yr)
70	30	30	350

END

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Tables A-15 and A-16 Toluene C9-C18
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Table A-16. Maximum Toluene (C9-C18 Aliphatics) Shallow Soil Vapor Concentration

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, $\theta_a{}^V$ (cm^3/cm^3)	Vadose zone soil effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Floor-wall seam perimeter, X_{crack} (cm)	Soil gas conc. (µg/m^3)	Bldg. ventilation rate, $Q_{building}$ (cm^3/s)
137.4	0.045	0.834	1.02E-07	0.055	5.62E-09	4,000	1.28E+04	3.39E+04

Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, $D^{eff}{}_V$ (cm^2/s)	Diffusion path length, L_d (cm)
1.00E+06	5.00E-03	15	9,001	6.29E-03	2.58E-01	1.80E-04	3.17E-05	137.4

Convection path length, L_p (cm)	Source vapor conc., C_{source} (µg/m^3)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ (µg/m^3)
15	1.28E+04	1.25	8.33E+01	3.17E-05	5.00E+03	#NUM!	6.78E-06	8.70E-02

Unit risk factor, URF (µg/m^3)$^{-1}$	Reference conc., RfC (mg/m^3)
NA	3.0E-01

END

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Tables A-15 and A-16 Toluene C9-C18
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Table A-17. Maximum C9-C16 Aromatics Shallow Soil Vapor Concentration

SG-SCREEN
PA Version 2.0; 04/

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Vapor Intrusion Guidance
Interim Final 12/04
(last modified 2/4/09)

Soil Gas Concentration Data

ENTER	ENTER		ENTER	
Chemical CAS No. (numbers only, no dashes)	Soil gas conc., C_g ($\mu g/m^3$)	OR	Soil gas conc., C_g (ppmv)	Chemical
91576	1.28E+04			2-Methylnaphthalene

MORE ↓

ENTER	ENTER	ENTER	ENTER		ENTER
Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	Soil gas sampling depth below grade, L_s (cm)	Average soil temperature, T_S (^oC)	Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	152.4	24	S		

MORE ↓

ENTER	ENTER	ENTER	ENTER	ENTER
Vandose zone SCS soil type [Lookup Soil Parameters]	Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	Vadose zone soil total porosity, n^V (unitless)	Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)	Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
S	1.83	0.324	0.279	5

MORE ↓

ENTER	ENTER	ENTER	ENTER
Averaging time for carcinogens, AT_C (yrs)	Averaging time for noncarcinogens, AT_{NC} (yrs)	Exposure duration, ED (yrs)	Exposure frequency, EF (days/yr)
70	30	30	350

END

Tables A-17 and A-18 2MN C9-C16
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Table A-18. Maximum C9-C16 Aromatics Shallow Soil Vapor Concentration

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm³/cm³)	Vadose zone soil effective total fluid saturation, S_{te} (cm³/cm³)	Vadose zone soil intrinsic permeability, k_i (cm²)	Vadose zone soil relative air permeability, k_{rg} (cm²)	Vadose zone soil effective vapor permeability, k_v (cm²)	Floor-wall seam perimeter, X_{crack} (cm)	Soil gas conc. (μg/m³)	Bldg. ventilation rate, $Q_{building}$ (cm³/s)
137.4	0.045	0.834	1.02E-07	0.055	5.62E-09	4,000	1.28E+04	3.39E+04

Area of enclosed space below grade, A_B (cm²)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} (atm-m³/mol)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm²/s)	Diffusion path length, L_d (cm)
1.00E+06	5.00E-03	15	16,057	4.72E-04	1.93E-02	1.80E-04	7.07E-05	137.4

Convection path length, L_p (cm)	Source vapor conc., C_{source} (μg/m³)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm³/s)	Crack effective diffusion coefficient, D^{crack} (cm²/s)	Area of crack, A_{crack} (cm²)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ (μg/m³)
15	1.28E+04	1.25	8.33E+01	7.07E-05	5.00E+03	#NUM!	1.51E-05	1.94E-01

Unit risk factor, URF (μg/m³)⁻¹	Reference conc., RfC (mg/m³)
NA	1.4E-02

END

Tables A-17 and A-18 2MN C9-C16
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Table A-19. Maximum Benzene Deep Soil Vapor Concentration

SG-SCREEN
PA Version 2.0; 04/

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DTSC

Vapor Intrusion Guidance
Interim Final 12/04
(last modified 2/4/09)

Soil Gas Concentration Data

ENTER	**ENTER**		**ENTER**	
Chemical	Soil		Soil	
CAS No.	gas	OR	gas	
(numbers only,	conc.,		conc.,	
	C_g		C_g	
no dashes)	$(\mu g/m^3)$		(ppmv)	Chemical
71432	2.80E+02			Benzene

MORE ↓

ENTER	**ENTER**	**ENTER**	**ENTER**		**ENTER**
Depth					
below grade	Soil gas		Vadose zone		User-defined
to bottom	sampling	Average	SCS		vadose zone
of enclosed	depth	soil	soil type	OR	soil vapor
space floor,	below grade,	temperature,	(used to estimate		permeability,
L_F	L_s	T_S	soil vapor		k_v
(15 or 200 cm)	(cm)	(^{o}C)	permeability)		(cm^2)
15	304.8	24	S		

MORE ↓

ENTER	**ENTER**	**ENTER**	**ENTER**	**ENTER**
Vandose zone	Vadose zone	Vadose zone	Vadose zone	Average vapor
SCS	soil dry	soil total	soil water-filled	flow rate into bldg.
soil type	bulk density,	porosity,	porosity,	(Leave blank to calculate)
Lookup Soil Parameters	ρ_b^A	n^V	θ_w^V	Q_{soil}
	(g/cm^3)	(unitless)	(cm^3/cm^3)	(L/m)
S	1.83	0.324	0.279	5

MORE ↓

ENTER	**ENTER**	**ENTER**	**ENTER**
Averaging	Averaging		
time for	time for	Exposure	Exposure
carcinogens,	noncarcinogens,	duration,	frequency,
AT_C	AT_{NC}	ED	EF
(yrs)	(yrs)	(yrs)	(days/yr)
70	30	30	350

END

Tables A-19 and A-20 Benzene
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Table A-20. Maximum Benzene Deep Soil Vapor Concentration

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm³/cm³)	Vadose zone soil effective total fluid saturation, S_{te} (cm³/cm³)	Vadose zone soil intrinsic permeability, k_i (cm²)	Vadose zone soil relative air permeability, k_{rg} (cm²)	Vadose zone soil effective vapor permeability, k_v (cm²)	Floor-wall seam perimeter, X_{crack} (cm)	Soil gas conc. (µg/m³)	Bldg. ventilation rate, $Q_{building}$ (cm³/s)
289.8	0.045	0.834	1.02E-07	0.055	5.62E-09	4,000	2.80E+02	3.39E+04

Area of enclosed space below grade, A_B (cm²)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} (atm-m³/mol)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm²/s)	Diffusion path length, L_d (cm)
1.00E+06	5.00E-03	15	7,977	5.29E-03	2.17E-01	1.80E-04	3.36E-05	289.8

Convection path length, L_p (cm)	Source vapor conc., C_{source} (µg/m³)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm³/s)	Crack effective diffusion coefficient, D^{crack} (cm²/s)	Area of crack, A_{crack} (cm²)	Exponent of equivalent foundation Peclet number, $exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ (µg/m³)
15	2.80E+02	1.25	8.33E+01	3.36E-05	5.00E+03	#NUM!	3.42E-06	9.56E-04

Unit risk factor, URF (µg/m³)⁻¹	Reference conc., RfC (mg/m³)
2.9E-05	3.0E-02

END

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Tables A-19 and A-20 Benzene
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Table A-21. Maximum Chloroform Deep Soil Vapor Concentration

SG-SCREEN
PA Version 2.0; 04/

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Vapor Intrusion Guidance

Interim Final 12/04

(last modified 2/4/09)

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	**ENTER** Soil gas conc., C_g ($\mu g/m^3$)	OR	**ENTER** Soil gas conc., C_g (ppmv)	Chemical
67663	4.30E+00			Chloroform

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	**ENTER** Soil gas sampling depth below grade, L_s (cm)	**ENTER** Average soil temperature, T_S (^{o}C)	**ENTER** Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	**ENTER** User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	304.8	24	S		

MORE ↓

ENTER Vandose zone SCS soil type (Lookup Soil Parameters)	**ENTER** Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	**ENTER** Vadose zone soil total porosity, n^V (unitless)	**ENTER** Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)	**ENTER** Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
S	1.83	0.324	0.279	5

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	**ENTER** Averaging time for noncarcinogens, AT_{NC} (yrs)	**ENTER** Exposure duration, ED (yrs)	**ENTER** Exposure frequency, EF (days/yr)
70	30	30	350

END

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DTSC Indoor Air Guidance
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Tables A-21 and A-22 Chloroform
3/17/2010
9:42 AM

Table A-22. Maximum Chloroform Deep Soil Vapor Concentration

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone soil effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Floor-wall seam perimeter, X_{crack} (cm)	Soil gas conc. (μg/m^3)	Bldg. ventilation rate, $Q_{building}$ (cm^3/s)
289.8	0.045	0.834	1.02E-07	0.055	5.62E-09	4,000	4.30E+00	3.39E+04

Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Diffusion path length, L_d (cm)
1.00E+06	5.00E-03	15	7,407	3.51E-03	1.44E-01	1.80E-04	4.19E-05	289.8

Convection path length, L_p (cm)	Source vapor conc., C_{source} (μg/m^3)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ (μg/m^3)
15	4.30E+00	1.25	8.33E+01	4.19E-05	5.00E+03	#NUM!	4.26E-06	1.83E-05

Unit risk factor, URF (μg/m^3)$^{-1}$	Reference conc., RfC (mg/m^3)
5.3E-06	3.0E-01

END

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Tables A-21 and A-22 Chloroform
3/17/2010
9:42 AM

Table A-23. Maximum Ethylbenzene Deep Soil Vapor Concentration

SG-SCREEN
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Reset to
Defaults

Soil Gas Concentration Data

ENTER	ENTER		ENTER	
Chemical CAS No. (numbers only, no dashes)	Soil gas conc., C_g ($\mu g/m^3$)	OR	Soil gas conc., C_g (ppmv)	Chemical
100414	1.90E+02			Ethylbenzene

MORE ↓

ENTER	ENTER	ENTER	ENTER		ENTER
Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	Soil gas sampling depth below grade, L_s (cm)	Average soil temperature, T_S (^oC)	Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	304.8	24	S		

MORE ↓

ENTER	ENTER	ENTER	ENTER	ENTER
Vandose zone SCS soil type (Lookup Soil Parameters)	Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	Vadose zone soil total porosity, n^V (unitless)	Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)	Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
S	1.83	0.324	0.279	5

MORE ↓

ENTER	ENTER	ENTER	ENTER
Averaging time for carcinogens, AT_C (yrs)	Averaging time for noncarcinogens, AT_{NC} (yrs)	Exposure duration, ED (yrs)	Exposure frequency, EF (days/yr)
70	30	30	350

END

Tables A-23 and A-24 Ethylbenzene
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Table A-24. Maximum Ethylbenzene Deep Soil Vapor Concentration

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm³/cm³)	Vadose zone soil effective total fluid saturation, S_{te} (cm³/cm³)	Vadose zone soil intrinsic permeability, k_i (cm²)	Vadose zone soil relative air permeability, k_{rg} (cm²)	Vadose zone soil effective vapor permeability, k_v (cm²)	Floor-wall seam perimeter, X_{crack} (cm)	Soil gas conc. (μg/m³)	Bldg. ventilation rate, $Q_{building}$ (cm³/s)
289.8	0.045	0.834	1.02E-07	0.055	5.62E-09	4,000	1.90E+02	3.39E+04

Area of enclosed space below grade, A_B (cm²)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} (atm-m³/mol)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm²/s)	Diffusion path length, L_d (cm)
1.00E+06	5.00E-03	15	9,994	7.43E-03	3.05E-01	1.80E-04	2.69E-05	289.8

Convection path length, L_p (cm)	Source vapor conc., C_{source} (μg/m³)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm³/s)	Crack effective diffusion coefficient, D^{crack} (cm²/s)	Area of crack, A_{crack} (cm²)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ (μg/m³)
15	1.90E+02	1.25	8.33E+01	2.69E-05	5.00E+03	#NUM!	2.73E-06	5.19E-04

Unit risk factor, URF (μg/m³)⁻¹	Reference conc., RfC (mg/m³)
2.5E-06	1.0E+00

END

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Tables A-23 and A-24 Ethylbenzene
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Table A-25. Maximum Naphthalene Deep Soil Vapor Concentration

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Soil Gas Concentration Data

ENTER	ENTER		ENTER	
	Soil	OR	Soil	
Chemical	gas		gas	
CAS No.	conc.,		conc.,	
(numbers only,	C_g		C_g	
no dashes)	($\mu g/m^3$)		(ppmv)	Chemical
91203	9.00E+02			Naphthalene

MORE ↓

ENTER	ENTER	ENTER	ENTER		ENTER
Depth					
below grade	Soil gas		Vadose zone		User-defined
to bottom	sampling	Average	SCS		vadose zone
of enclosed	depth	soil	soil type		soil vapor
space floor,	below grade,	temperature,	(used to estimate	OR	permeability,
L_F	L_s	T_S	soil vapor		k_v
(15 or 200 cm)	(cm)	(°C)	permeability)		(cm^2)
15	304.8	24	S		

MORE ↓

ENTER	ENTER	ENTER	ENTER	ENTER
Vandose zone	Vadose zone	Vadose zone	Vadose zone	Average vapor
SCS	soil dry	soil total	soil water-filled	flow rate into bldg.
soil type	bulk density,	porosity,	porosity,	(Leave blank to calculate)
Lookup Soil Parameters	ρ_b^A	n^V	θ_w^V	Q_{soil}
	(g/cm^3)	(unitless)	(cm^3/cm^3)	(L/m)
S	1.83	0.324	0.279	5

MORE ↓

ENTER	ENTER	ENTER	ENTER
Averaging	Averaging		
time for	time for	Exposure	Exposure
carcinogens,	noncarcinogens,	duration,	frequency,
AT_C	AT_{NC}	ED	EF
(yrs)	(yrs)	(yrs)	(days/yr)
70	30	30	350

END

Tables A-25 and A-26 Naphthalene
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Table A-26. Maximum Naphthalene Deep Soil Vapor Concentration

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm³/cm³)	Vadose zone soil effective total fluid saturation, S_{te} (cm³/cm³)	Vadose zone soil intrinsic permeability, k_i (cm²)	Vadose zone soil relative air permeability, k_{rg} (cm²)	Vadose zone soil effective vapor permeability, k_v (cm²)	Floor-wall seam perimeter, X_{crack} (cm)	Soil gas conc. (µg/m³)	Bldg. ventilation rate, $Q_{building}$ (cm³/s)
289.8	0.045	0.834	1.02E-07	0.055	5.62E-09	4,000	9.00E+02	3.39E+04

Area of enclosed space below grade, A_B (cm²)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} (atm-m³/mol)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm²/s)	Diffusion path length, L_d (cm)
1.00E+06	5.00E-03	15	12,768	4.48E-04	1.84E-02	1.80E-04	7.38E-05	289.8

Convection path length, L_p (cm)	Source vapor conc., C_{source} (µg/m³)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm³/s)	Crack effective diffusion coefficient, D^{crack} (cm²/s)	Area of crack, A_{crack} (cm²)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ (µg/m³)
15	9.00E+02	1.25	8.33E+01	7.38E-05	5.00E+03	#NUM!	7.49E-06	6.74E-03

Unit risk factor, URF (µg/m³)⁻¹	Reference conc., RfC (mg/m³)
3.4E-05	3.0E-03

END

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Tables A-25 and A-26 Naphthalene
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Table A-27. Maximum Toluene Deep Soil Vapor Concentration

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Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	**ENTER** Soil gas conc., C_g ($\mu g/m^3$)	OR	**ENTER** Soil gas conc., C_g (ppmv)	Chemical
108883	1.00E+03			Toluene

MORE ↓	**ENTER** Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	**ENTER** Soil gas sampling depth below grade, L_s (cm)	**ENTER** Average soil temperature, T_S (^oC)	**ENTER** Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	**ENTER** User-defined vadose zone soil vapor permeability, k_v (cm^2)
	15	304.8	24	S		

MORE ↓	**ENTER** Vandose zone SCS soil type [Lookup Soil Parameters]	**ENTER** Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	**ENTER** Vadose zone soil total porosity, n^V (unitless)	**ENTER** Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)	**ENTER** Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
	S	1.83	0.324	0.279	5

MORE ↓	**ENTER** Averaging time for carcinogens, AT_C (yrs)	**ENTER** Averaging time for noncarcinogens, AT_{NC} (yrs)	**ENTER** Exposure duration, ED (yrs)	**ENTER** Exposure frequency, EF (days/yr)
	70	30	30	350

END

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Tables A-27 and A-28 Toluene
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Table A-28. Maximum Toluene Deep Soil Vapor Concentration

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone soil effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Floor-wall seam perimeter, X_{crack} (cm)	Soil gas conc. (μg/m^3)	Bldg. ventilation rate, $Q_{building}$ (cm^3/s)
289.8	0.045	0.834	1.02E-07	0.055	5.62E-09	4,000	1.00E+03	3.39E+04

Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Diffusion path length, L_d (cm)
1.00E+06	5.00E-03	15	9,001	6.29E-03	2.58E-01	1.80E-04	3.17E-05	289.8

Convection path length, L_p (cm)	Source vapor conc., C_{source} (μg/m^3)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ (μg/m^3)
15	1.00E+03	1.25	8.33E+01	3.17E-05	5.00E+03	#NUM!	3.22E-06	3.22E-03

Unit risk factor, URF (μg/m^3)$^{-1}$	Reference conc., RfC (mg/m^3)
NA	3.0E-01

END

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Tables A-27 and A-28 Toluene
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Table A-29. Maximum Xylenes Deep Soil Vapor Concentration

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Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	**ENTER** Soil gas conc., C_g ($\mu g/m^3$)	OR	**ENTER** Soil gas conc., C_g (ppmv)	Chemical
106423	6.30E+02			p-Xylene

| MORE ↓ |

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	**ENTER** Soil gas sampling depth below grade, L_s (cm)	**ENTER** Average soil temperature, T_S (^oC)	**ENTER** Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	**ENTER** User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	304.8	24	S		

| MORE ↓ |

ENTER Vandose zone SCS soil type	Lookup Soil Parameters	**ENTER** Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	**ENTER** Vadose zone soil total porosity, n^V (unitless)	**ENTER** Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)	**ENTER** Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
S		1.83	0.324	0.279	5

| MORE ↓ |

ENTER Averaging time for carcinogens, AT_C (yrs)	**ENTER** Averaging time for noncarcinogens, AT_{NC} (yrs)	**ENTER** Exposure duration, ED (yrs)	**ENTER** Exposure frequency, EF (days/yr)
70	30	30	350

| END |

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Tables A-29 and A-30 Xylenes
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Table A-30. Maximum Xylenes Deep Soil Vapor Concentration

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm³/cm³)	Vadose zone soil effective total fluid saturation, S_{te} (cm³/cm³)	Vadose zone soil intrinsic permeability, k_i (cm²)	Vadose zone soil relative air permeability, k_{rg} (cm²)	Vadose zone soil effective vapor permeability, k_v (cm²)	Floor-wall seam perimeter, X_{crack} (cm)	Soil gas conc. (µg/m³)	Bldg. ventilation rate, $Q_{building}$ (cm³/s)
289.8	0.045	0.834	1.02E-07	0.055	5.62E-09	4,000	6.30E+02	3.39E+04

Area of enclosed space below grade, A_B (cm²)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} (atm-m³/mol)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm²/s)	Diffusion path length, L_d (cm)
1.00E+06	5.00E-03	15	10,083	7.22E-03	2.96E-01	1.80E-04	2.79E-05	289.8

Convection path length, L_p (cm)	Source vapor conc., C_{source} (µg/m³)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm³/s)	Crack effective diffusion coefficient, D^{crack} (cm²/s)	Area of crack, A_{crack} (cm²)	Exponent of equivalent foundation Peclet number, $exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ (µg/m³)
15	6.30E+02	1.25	8.33E+01	2.79E-05	5.00E+03	#NUM!	2.83E-06	1.79E-03

Unit risk factor, URF (µg/m³)⁻¹	Reference conc., RfC (mg/m³)
NA	1.0E-01

END

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Tables A-29 and A-30 Xylenes
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Table A-31. Maximum Hexane (C5-C8 Aliphatics) Deep Soil Vapor Concentration

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Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g ($\mu g/m^3$)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
110543	9.00E+05			Hexane

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Soil gas sampling depth below grade, L_s (cm)	ENTER Average soil temperature, T_S (^{o}C)	ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	304.8	24	S		

MORE ↓

ENTER Vandose zone SCS soil type [Lookup Soil Parameters]	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
S	1.83	0.324	0.279	5

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
70	30	30	350

END

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Tables A-31 and A-32 Hexane C5-C8
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Table A-32. Maximum Hexane (C5-C8 Aliphatics) Deep Soil Vapor Concentration

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm³/cm³)	Vadose zone soil effective total fluid saturation, S_{te} (cm³/cm³)	Vadose zone soil intrinsic permeability, k_i (cm²)	Vadose zone soil relative air permeability, k_{rg} (cm²)	Vadose zone soil effective vapor permeability, k_v (cm²)	Floor-wall seam perimeter, X_{crack} (cm)	Soil gas conc. (µg/m³)	Bldg. ventilation rate, $Q_{building}$ (cm³/s)
289.8	0.045	0.834	1.02E-07	0.055	5.62E-09	4,000	9.00E+05	3.39E+04

Area of enclosed space below grade, A_B (cm²)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} (atm-m³/mol)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm²/s)	Diffusion path length, L_d (cm)
1.00E+06	5.00E-03	15	7,549	1.59E+00	6.53E+01	1.80E-04	6.24E-05	289.8

Convection path length, L_p (cm)	Source vapor conc., C_{source} (µg/m³)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm³/s)	Crack effective diffusion coefficient, D^{crack} (cm²/s)	Area of crack, A_{crack} (cm²)	Exponent of equivalent foundation Peclet number, $exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ (µg/m³)
15	9.00E+05	1.25	8.33E+01	6.24E-05	5.00E+03	#NUM!	6.34E-06	5.70E+00

Unit risk factor, URF (µg/m³)⁻¹	Reference conc., RfC (mg/m³)
NA	7.0E-01

END

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Tables A-31 and A-32 Hexane C5-C8
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Table A-33. Maximum Toluene (C9-C18 Aliphatics) Deep Soil Vapor Concentration

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Soil Gas Concentration Data

ENTER	ENTER		ENTER	
Chemical CAS No. (numbers only, no dashes)	Soil gas conc., C_g ($\mu g/m^3$)	OR	Soil gas conc., C_g (ppmv)	Chemical
108883	9.00E+05			Toluene

MORE ↓

ENTER	ENTER	ENTER	ENTER		ENTER
Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	Soil gas sampling depth below grade, L_s (cm)	Average soil temperature, T_S (^oC)	Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	304.8	24	S		

MORE ↓

ENTER	ENTER	ENTER	ENTER	ENTER
Vandose zone SCS soil type *Lookup Soil Parameters*	Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	Vadose zone soil total porosity, n^V (unitless)	Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)	Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
S	1.83	0.324	0.279	5

MORE ↓

ENTER	ENTER	ENTER	ENTER
Averaging time for carcinogens, AT_C (yrs)	Averaging time for noncarcinogens, AT_{NC} (yrs)	Exposure duration, ED (yrs)	Exposure frequency, EF (days/yr)
70	30	30	350

END

Tables A-33 and A-34 Toluene C9-C18
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Table A-34. Maximum Toluene (C9-C18 Aliphatics) Deep Soil Vapor Concentration

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone soil effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Floor-wall seam perimeter, X_{crack} (cm)	Soil gas conc. (μg/m^3)	Bldg. ventilation rate, $Q_{building}$ (cm^3/s)
289.8	0.045	0.834	1.02E-07	0.055	5.62E-09	4,000	9.00E+05	3.39E+04

Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Diffusion path length, L_d (cm)
1.00E+06	5.00E-03	15	9,001	6.29E-03	2.58E-01	1.80E-04	3.17E-05	289.8

Convection path length, L_p (cm)	Source vapor conc., C_{source} (μg/m^3)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ (μg/m^3)
15	9.00E+05	1.25	8.33E+01	3.17E-05	5.00E+03	#NUM!	3.22E-06	2.90E+00

Unit risk factor, URF (μg/m^3)$^{-1}$	Reference conc., RfC (mg/m^3)
NA	3.0E-01

END

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Tables A-33 and A-34 Toluene C9-C18
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Table A-35. Maximum C9-C16 Aromatics Deep Soil Vapor Concentration

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Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	**ENTER** Soil gas conc., C_g ($\mu g/m^3$)	OR	**ENTER** Soil gas conc., C_g (ppmv)	Chemical
91576	9.00E+05			2-Methylnaphthalene

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	**ENTER** Soil gas sampling depth below grade, L_s (cm)	**ENTER** Average soil temperature, T_S (^oC)	**ENTER** Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	**ENTER** User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	304.8	24	S		

MORE ↓

ENTER Vandose zone SCS soil type [Lookup Soil Parameters]	**ENTER** Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	**ENTER** Vadose zone soil total porosity, n^V (unitless)	**ENTER** Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)	**ENTER** Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
S	1.83	0.324	0.279	5

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	**ENTER** Averaging time for noncarcinogens, AT_{NC} (yrs)	**ENTER** Exposure duration, ED (yrs)	**ENTER** Exposure frequency, EF (days/yr)
70	30	30	350

END

Tables A-35 and A-36 2MN C9-C16
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Table A-36. Maximum C9-C16 Aromatics Deep Soil Vapor Concentration

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm³/cm³)	Vadose zone soil effective total fluid saturation, S_{te} (cm³/cm³)	Vadose zone soil intrinsic permeability, k_i (cm²)	Vadose zone soil relative air permeability, k_{rg} (cm²)	Vadose zone soil effective vapor permeability, k_v (cm²)	Floor-wall seam perimeter, X_{crack} (cm)	Soil gas conc. (μg/m³)	Bldg. ventilation rate, $Q_{building}$ (cm³/s)
289.8	0.045	0.834	1.02E-07	0.055	5.62E-09	4,000	9.00E+05	3.39E+04

Area of enclosed space below grade, A_B (cm²)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} (atm-m³/mol)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm²/s)	Diffusion path length, L_d (cm)
1.00E+06	5.00E-03	15	16,057	4.72E-04	1.93E-02	1.80E-04	7.07E-05	289.8

Convection path length, L_p (cm)	Source vapor conc., C_{source} (μg/m³)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm³/s)	Crack effective diffusion coefficient, D^{crack} (cm²/s)	Area of crack, A_{crack} (cm²)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ (μg/m³)
15	9.00E+05	1.25	8.33E+01	7.07E-05	5.00E+03	#NUM!	7.18E-06	6.46E+00

Unit risk factor, URF (μg/m³)⁻¹	Reference conc., RfC (mg/m³)
NA	1.4E-02

END

DTSC / HERD
Last Update: 11/1/03

DTSC Indoor Air Guidance
Unclassified Soil Screening Model

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