

SL-ADV
Version 3.1; 02/04

CALCULATE RISK-BASED SOIL CONCENTRATION (enter "X" in "YES" box)

YES

Reset to Defaults

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL SOIL CONCENTRATION (enter "X" in "YES" box and initial soil conc. below)

YES

ENTER
Chemical
CAS No.
(numbers only,
no dashes)

ENTER
Initial
soil
conc.,
 C_0
(mg/kg)

Chemical

108883

Toluene

MORE
↓

ENTER Average soil temperature, T_s (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_f (cm)	ENTER Depth below grade to top of contamination, L_1 (cm)	ENTER Depth below grade to bottom of contamination, (enter value of 0 if value is unknown) L_b (cm)	ENTER Totals must add up to value of L_1 (cell G28)			ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	ENTER User-defined stratum A soil vapor permeability, k_v (cm ²)
T_s (°C)	L_f (cm)	L_1 (cm)	L_b (cm)	Thickness of soil stratum A, h_A (cm)	Thickness of soil stratum B, (Enter value or 0) h_B (cm)	Thickness of soil stratum C, (Enter value or 0) h_C (cm)	OR	k_v (cm ²)
11	15	15	365	15	0	0	SL	

MORE
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ENTER Stratum A SCS soil type Lookup Soil Parameters	ENTER Stratum A soil dry bulk density, r_b^A (g/cm ³)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, q_w^A (cm ³ /cm ³)	ENTER Stratum A soil organic carbon fraction, f_{oc}^A (unitless)	ENTER Stratum B SCS soil type Lookup Soil Parameters	ENTER Stratum B soil dry bulk density, r_b^B (g/cm ³)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, q_w^B (cm ³ /cm ³)	ENTER Stratum B soil organic carbon fraction, f_{oc}^B (unitless)	ENTER Stratum C SCS soil type Lookup Soil Parameters	ENTER Stratum C soil dry bulk density, r_b^C (g/cm ³)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, q_w^C (cm ³ /cm ³)	ENTER Stratum C soil organic carbon fraction, f_{oc}^C (unitless)
SL	1.8315666	0.3036	0.15447168	0.002										

MORE
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ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, DP (g/cm-s ²)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	304.8	0.1	1	

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)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	0.1

END

Used to calculate risk-based
soil concentration.

CHEMICAL PROPERTIES SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H ($\text{atm}\cdot\text{m}^3/\text{mol}$)	Henry's law constant reference temperature, T_R ($^\circ\text{C}$)	Enthalpy of vaporization at the normal boiling point, $DH_{v,b}$ (cal/mol)	Normal boiling point, T_B ($^\circ\text{K}$)	Critical temperature, T_C ($^\circ\text{K}$)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF (mg/m^3) ⁻¹	Reference conc., RfC (mg/m^3)	Physical state at soil temperature, (S,L,G)
8.70E-02	8.60E-06	6.62E-03	25	7,930	383.78	591.79	1.82E+02	5.26E+02	0.0E+00	4.0E-01	L

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, t (sec)	Source-building separation, L _T (cm)	Stratum A soil air-filled porosity, q _a ^A (cm ³ /cm ³)	Stratum B soil air-filled porosity, q _a ^B (cm ³ /cm ³)	Stratum C soil air-filled porosity, q _a ^C (cm ³ /cm ³)	Stratum A effective total fluid saturation, S _{se} (cm ³ /cm ³)	Stratum A soil intrinsic permeability, k _i (cm ²)	Stratum A soil relative air permeability, k _{rg} (cm ²)	Stratum A soil effective vapor permeability, k _v (cm ²)	Floor-wall seam perimeter, X _{crack} (cm)	Initial soil concentration used, C _R (mg/kg)	Bldg. ventilation rate, Q _{building} (cm ³ /s)
7.88E+08	1	0.149	ERROR	ERROR	0.436	5.94E-09	0.718	4.27E-09	4,000	1.00E+00	8.47E+04

Area of enclosed space below grade, A _B (cm ²)	Crack-to-total area ratio, h (unitless)	Crack depth below grade, Z _{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, DH _{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, m _s (g/cm-s)	Stratum A effective diffusion coefficient, D ^{eff} _A (cm ² /s)	Stratum B effective diffusion coefficient, D ^{eff} _B (cm ² /s)	Stratum C effective diffusion coefficient, D ^{eff} _C (cm ² /s)	Total overall effective diffusion coefficient, D ^{eff} _T (cm ² /s)	Diffusion path length, L _d (cm)	Convection path length, L _p (cm)
1.06E+06	3.77E-04	15	9,144	3.10E-03	1.33E-01	1.76E-04	1.67E-03	0.00E+00	0.00E+00	1.67E-03	1	15

Soil-water partition coefficient, K _d (cm ³ /g)	Source vapor conc., C _{source} (ng/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 Peclet number, exp(Pe ¹) (unitless)	Infinite source indoor attenuation coefficient, a (unitless)	Infinite source bldg. conc., C _{building} (ng/m ³)	Finite source b term (unitless)	Finite source y term (sec) ⁻¹	Time for source depletion, t _D (sec)	Exposure duration > time for source depletion (YES/NO)
3.64E-01	2.89E+02	0.10	4.28E+00	1.67E-03	4.00E+02	6.13E+27	NA	NA	4.15E+02	2.64E-04	7.82E+08	YES

Finite indoor attenuation coefficient, <a> (unitless)	Mass limit bldg. conc., C _{building} (ng/m ³)	Finite source conc., C _{building} (ng/m ³)	Final finite source bldg. conc., C _{building} (ng/m ³)	Unit risk factor, URF (mg/m ³) ⁻¹	Reference conc., RfC (mg/m ³)
NA	1.02E-02	NA	1.02E-02	NA	4.0E-01

END

RESULTS SHEET

RISK-BASED SOIL CONCENTRATION CALCULATIONS:

Indoor exposure soil conc., carcinogen (ng/kg)	Indoor exposure soil conc., noncarcinogen (ng/kg)	Risk-based indoor exposure soil conc., (ng/kg)	Soil saturation conc., C_{sat} (ng/kg)	Final indoor exposure soil conc., (ng/kg)
NA	5.74E+03	5.74E+03	2.42E+05	5.74E+03

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	NA

MESSAGE AND ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)

MESSAGE: The values of Csource and Cbuilding on the INTERCALCS worksheet are based on unity and do not represent actual values.

SCROLL
DOWN
TO "END"

END