

California Human Health Screening Levels

Table 1. Soil Screening Numbers (mg/kg soil) for Nonvolatile Chemicals Based on Total Exposure to Contaminated Soil: Inhalation, Ingestion and Dermal Absorption.

Table 2. Soil-Gas-Screening Numbers for Volatile Chemicals below Buildings Constructed With Engineered Fill below Sub-slab Gravel.

Table 3. Soil-Gas-Screening Numbers for Volatile Chemicals below Buildings Constructed Without Engineered Fill below Sub-slab Gravel

Table 1. Soil Screening Numbers (mg/kg soil) for Nonvolatile Chemicals Based on Total Exposure to Contaminated Soil: Inhalation, Ingestion and Dermal Absorption

Chemical	Soil-Screening Number (mg per kg of dry soil)			
	Residential Scenario		Commercial/Industrial Scenario	
<u>Organic Acidic Chemicals</u>		Basis ¹		Basis ¹
2, 4-D	6.9E+02	(nc)	7.7E+03	(nc)
2,4,5-T	5.5E+02	(nc)	6.1E+03	(nc)
Pentachlorophenol	4.4E+00	(ca)	1.3E+01	(ca)
<u>Organic Neutral Chemicals</u>				
Aldrin	3.3E-02	(ca)	1.3E-01	(ca)
Benzo(a)pyrene	3.8E-02	(ca)	1.3E-01	(ca)
Chlordane	4.3E-01	(ca)	1.7E+00	(ca)
DDD	2.3E+00	(ca)	9.0E+00	(ca)
DDE	1.6E+00	(ca)	6.3E+00	(ca)
DDT	1.6E+00	(ca)	6.3E+00	(ca)
Dieldrin	3.5E-02	(ca)	1.3E-01	(ca)
1,4-Dioxane	1.8E+01	(ca)	6.4E+01	(ca)
Dioxin (2,3,7, 8-TCDD)	4.6E-06	(ca)	1.9E-05	(ca)
Endrin	2.1E+01	(nc)	2.3E+02	(nc)
Heptachlor	1.3E-01	(ca)	5.2E-01	(ca)
Lindane	5.0E-01	(ca)	2.0E+00	(ca)
Kepone	3.5E-02	(ca)	1.3E-01	(ca)
Methoxychlor	3.4E+02	(nc)	3.8E+03	(nc)
Mirex	3.1E-02	(ca)	1.2E-01	(ca)
PCBs	8.9E-02	(ca)	3.0E-01	(ca)
Toxaphene	4.6E-01	(ca)	1.8E+00	(ca)

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Chemical	Soil-Screening Number (mg per kg of dry soil)			
<u>Inorganic Chemicals</u>				
Antimony and compounds	3.0E+01	(nc)	3.8E+02	(nc)
Arsenic²	7.0E-02	(ca)	2.4E-01	(ca)
Barium and compounds	5.2E+03	(nc)	6.3E+04	(nc)
Beryllium and compounds	1.6E+01⁴	(nc)	1.9E+02⁴	(nc)
Beryllium oxide	1.6E+01⁴	(nc)	1.9E+02⁴	(nc)
Beryllium sulfate³	2.9E+00⁴	(ca)	6.3E+00⁴	(ca)
Cadmium and compounds	1.7E+00	(ca)	7.5E+00	(ca)
Chromium III	1.0E+05	(nc,max)	1.0E+05	(nc,max)
Chromium VI	1.7E+01	(ca)	3.7E+01	(ca)
Cobalt	6.6E+02	(nc)	3.2E+03	(nc)
Copper and compounds	3.0E+03	(nc)	3.8E+04	(nc)
Fluoride	4.6E+03	(nc)	5.7E+04	(nc)
Lead and lead compounds	8.0E+01⁵	(nc)	3.2E+02⁵	(nc)
Lead acetate³	2.3E+00	(ca)	1.0E+01	(ca)
Mercury and compounds	1.8E+01	(nc)	1.8E+02	(nc)
Molybdenum	3.8E+02	(nc)	4.8E+03	(nc)
Nickel and compounds	1.6E+03	(nc)	1.6E+04	(nc)
Nickel subsulfide³	3.8E-01	(ca)	1.1E+04	(ca)
Perchlorate	2.8E+01^{6,7}	(nc)	3.5E+02^{6,7}	(nc)
Selenium	3.8E+02	(nc)	4.8E+03	(nc)
Silver and compounds	3.8E+02	(nc)	4.8E+03	(nc)
Thallium and compounds	5.0E+00	(nc)	6.3E+01	(nc)
Vanadium and compounds	5.3E+02	(nc)	6.7E+03	(nc)
Zinc	2.3E+04	(nc)	1.0E+05	(nc)

¹ (ca) denotes that the screening number is based on a carcinogenic potency factor, (nc) denotes that the screening number is based on a reference level for chronic toxic effects other than cancer, (max) denotes the screening number is based on the maximum concentration allowed, 100,000 mg/kg, and not toxicity. Unless otherwise noted, the derivation of the screening number can be found in [Human-Exposure-Based Screening Numbers Developed to Aid Estimation of Cleanup Costs for Contaminated Soil \(2005\)](#).

² The screening numbers for arsenic are for contamination resulting from human activity. Concentrations of naturally occurring arsenic may be far above the screening number. When

levels of arsenic at a site are a concern, the agency with authority over remediation decisions should be consulted.

³ These metal salts are significantly (greater than 10-fold) more toxic than the values for the metals in general. If it is known that this chemical was used at the site, the screening number for this chemical should be used instead of the screening number for the metal and its compounds.

⁴ Revised in 2009, [California Human Health Screening Levels for Beryllium](#).

⁵ Revised in 2009, [Revised California Human Health Screening Levels for Lead](#).

⁶ Added in 2010, [California Human Health Screening Levels for Perchlorate](#).

⁷ While these CHHSLs are considered safe for exposure to perchlorate in soil, the potential for significant groundwater contamination from soil contaminated with perchlorate at the CHHSLs levels may exist, since the PHG level for drinking water is 6 ppb or 6 µg/L.

Table 2. Soil-Gas Screening Numbers for Volatile Chemicals below Buildings Constructed with Engineered Fill below Sub-slab Gravel				
Chemical	Soil-Gas-Screening Number (µg per liter of soil gas)			
	Residential Scenario		Commercial/Industrial Scenario	
		Basis ¹		Basis ¹
Benzene	8.5 E-02	(ca)	2.8 E-01	(ca)
Carbon Tetrachloride	6.3 E-02	(ca)	2.1 E-01	(ca)
1,2-Dichloroethane	1.1 E-01	(ca)	3.6 E-01	(ca)
<i>cis</i> -1,2-Dichloroethylene	4.1 E+01	(nc)	1.2 E+02	(nc)
<i>trans</i> -1,2-Dichloroethylene	8.4 E+01	(nc)	2.4 E+02	(nc)
Ethylbenzene	1.1 E+00²	(ca)	3.6 E+00²	(ca)
Mercury (elemental)	2.0 E-01	(nc)	5.6 E-01	(nc)
Methyl <i>tert</i> -Butyl Ether	8.6 E+00	(ca)	2.9 E+01	(ca)
Naphthalene	9.3 E-02	(ca)	3.1 E-01	(ca)
Tetrachloroethylene	4.7 E-01	(ca)	1.6 E+00	(ca)
Tetraethyl Lead	1.6 E-03	(nc)	4.5 E-03	(nc)
Toluene	3.2 E+02	(nc)	8.9 E+02	(nc)
1,1,1-Trichloroethane	2.5 E+03	(nc)	7.0 E+03	(nc)
Trichloroethylene	1.3 E+00	(ca)	4.4 E+00	(ca)
Vinyl Chloride	2.8 E-02	(ca)	9.5 E-02	(ca)
<i>m</i> -Xylene	8.5 E+02	(nc)	2.4 E+03	(nc)
<i>o</i>-Xylene	7.4 E+02³	(nc)	2.1 E+03³	(nc)
<i>p</i> -Xylene	8.0 E+02	(nc)	2.2 E+03	(nc)

¹ (ca) denotes that the screening number is based on a carcinogenic potency factor, (nc) denotes that the screening number is based on a reference level in Table 3 for chronic toxic effects other than cancer, (max) denotes the screening number is based on the maximum concentration allowed, 100,000 mg/kg, and not toxicity.

² Added in 2010, [California Human Health Screening Levels for Ethylbenzene](#).

³ Recommended soil-gas-screening number for xylenes. The representative value for xylenes is based on the calculated lowest health-protective one amongst the three isomers.

Table 3. Soil-Gas Screening Numbers for Volatile Chemicals below Buildings Constructed without Engineered Fill below Sub-slab Gravel				
Chemical	Soil-Gas-Screening Number (µg per liter of soil gas)			
	Residential Scenario		Commercial/Industrial Scenario	
		Basis ¹		Basis ¹
Benzene	3.6 E-02	(ca)	1.2 E-01	(ca)
Carbon Tetrachloride	2.5 E-02	(ca)	8.5 E-02	(ca)
1,2-Dichloroethane	5.0 E-02	(ca)	1.7 E-01	(ca)
<i>cis</i> -1,2-Dichloroethylene	1.6 E+01	(nc)	4.4 E+01	(nc)
<i>trans</i> -1,2-Dichloroethylene	3.2 E+01	(nc)	8.9 E+01	(nc)
Ethylbenzene	4.2 E-01²	(ca)	1.4 E+00²	(ca)
Mercury (elemental)	4.5 E-02	(nc)	1.3 E-01	(nc)
Methyl <i>tert</i> -Butyl Ether	4.0 E+00	(ca)	1.3 E+01	(ca)
Naphthalene	3.2 E-02	(ca)	1.1 E-01	(ca)
Tetrachloroethylene	1.8 E-01	(ca)	6.0 E-01	(ca)
Tetraethyl Lead	2.1 E-04	(nc)	5.8 E-04	(nc)
Toluene	1.4 E+02	(nc)	3.8 E+02	(nc)
1,1,1-Trichloroethane	9.9 E+02	(nc)	2.8 E+03	(nc)
Trichloroethylene	5.3 E-01	(ca)	1.8 E+00	(ca)
Vinyl Chloride	1.3 E-02	(ca)	4.5 E-02	(ca)
<i>m</i> -Xylene	3.2 E+02	(nc)	8.9 E+02	(nc)
<i>o</i>-Xylene	3.2 E+02³	(nc)	8.8 E+02³	(nc)
<i>p</i> -Xylene	3.2 E+02	(nc)	8.9 E+02	(nc)

¹ (ca) denotes that the screening number is based on a carcinogenic potency factor, (nc) denotes that the screening number is based on a reference level for chronic toxic effects other than cancer, (max) denotes the screening number is based on the maximum concentration allowed, 100,000 mg/kg, and not toxicity.

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