

**Table 3
OEHHA/ARB APPROVED CHRONIC REFERENCE EXPOSURE LEVELS AND TARGET ORGANS***

Substance	Chemical Abstract Number ▼	Chronic Inhalation REL (µg/m ³)	Chronic Oral REL (mg/kg-d)	Date Value Reviewed [Added] ♦	Target Organs														
					Alimentary	Bone	Cardiovascular	Developmental	Endocrine	Eye	Hematologic	Immune	Kidney	Nervous	Reproductive	Respiratory	Skin		
ACETALDEHYDE	75-07-0	1.4E+02		12/08														X	
ACROLEIN	107-02-8	3.5E-01		12/08														X	
ACRYLONITRILE	107-13-1	5.0E+00		12/01														X	
AMMONIA	7664-41-7	2.0E+02		2/00														X	
ARSENIC AND COMPOUNDS (INORGANIC) ^{TAC}	7440-38-2 1016 [1015]	1.5E-02		12/08			X	X									X	X	X
			3.5E-06	12/08			X	X									X	X	X
ARSINE	7784-42-1	1.5E-02		12/08			X	X									X	X	X
BENZENE ^{TAC}	71-43-2	6.0E+01		2/00				X			X						X		
BERYLLIUM AND COMPOUNDS	7440-41-7 [1021]	7.0E-03		12/01							X							X	
			2.0E-03	12/01	X														
1,3-BUTADIENE ^{TAC}	106-99-0	2.0E+01		1/01														X	
CADMIUM AND COMPOUNDS ^{TAC}	7440-43-9 [1045]	2.0E-02		1/01													X		X
			5.0E-04	10/00													X		
CARBON DISULFIDE	75-15-0	8.0E+02		5/02													X	X	
CARBON TETRACHLORIDE ^{TAC} (Tetrachloromethane)	56-23-5	4.0E+01		1/01	X			X									X		
CHLORINE	7782-50-5	2.0E-01		2/00															X
CHLORINE DIOXIDE	10049-04-4	6.0E-01		1/01															X
CHLOROBENZENE	108-90-7	1.0E+03		1/01	X												X	X	
CHLOROFORM ^{TAC}	67-66-3	3.0E+02		4/00	X			X									X		
CHLOROPICRIN	76-06-2	4.0E-01		12/01															X
CHROMIUM 6+ ^{TAC}	18540-29-9	2.0E-01		1/01															X
			2.0E-02	10/00								X							
<i>Barium chromate</i>	10294-40-3	2.0E-01		1/01															✓
			2.0E-02	10/00								✓							
<i>Calcium chromate</i>	13765-19-0	2.0E-01		1/01															✓
			2.0E-02	10/00								✓							
<i>Lead chromate</i>	7758-97-6	2.0E-01		1/01															✓

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					Alimentary	Bone	Cardiovascular	Developmental	Endocrine	Eye	Hematologic	Immune	Kidney	Nervous	Reproductive	Respiratory	Skin	
			2.0E-02	10/00								✓						
Sodium dichromate	10588-01-9	2.0E-01		1/01														✓
			2.0E-02	10/00								✓						
Strontium chromate	7789-06-2	2.0E-01		1/01														✓
			2.0E-02	10/00								✓						
CHROMIUM TRIOXIDE (as chromic acid mist)	1333-82-0	2.0E-03		1/01														X
			2.0E-02	10/00								✓						
CRESOLS (mixtures of)	1319-77-3	6.0E+02		1/01													X	
m-CRESOL	108-39-4	6.0E+02		1/01													X	
o-CRESOL	95-48-7	6.0E+02		1/01													X	
p-CRESOL	106-44-5	6.0E+02		1/01													X	
Cyanide Compounds (inorganic)	57-12-5 1073	9.0E+00		4/00			✓		✓								✓	
HYDROGEN CYANIDE (Hydrocyanic acid)	74-90-8	9.0E+00		4/00			X		X								X	
p-DICHLOROBENZENE	106-46-7	8.0E+02		1/01	X									X	X			X
1,1,-DICHLOROETHYLENE ... (see Vinylidene Chloride)																		
DIESEL EXHAUST ... (see Particulate Emissions from Diesel-Fueled Engines)																		
DIETHANOLAMINE	111-42-2	3.0E+00		12/01			X										X	
N,N-DIMETHYL FORMAMIDE	68-12-2	8.0E+01		1/01	X													X
1,4-DIOXANE ⁺ (1,4-Diethylene dioxide)	123-91-1	3.0E+03		4/00	X		X							X				
EPICHLOROHYDRIN (1-Chloro-2,3-epoxypropane)	106-89-8	3.0E+00		1/01						X								X
1,2-EPOXYBUTANE	106-88-7	2.0E+01		1/01			X											X
ETHYL BENZENE	100-41-4	2.0E+03		2/00	X			X	X					X				
ETHYL CHLORIDE (Chlorethane)	75-00-3	3.0E+04		4/00	X			X										
ETHYLENE DIBROMIDE ^{TAC} (1,2-Dibromoethane)	106-93-4	8.0E-01		12/01													X	
ETHYLENE DICHLORIDE ^{TAC} (1,2-Dichloroethane)	107-06-2	4.0E+02		1/01	X													
ETHYLENE GLYCOL	107-21-1	4.0E+02		4/00				X						X				X

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					Alimentary	Bone	Cardiovascular	Developmental	Endocrine	Eye	Hematologic	Immune	Kidney	Nervous	Reproductive	Respiratory	Skin
MERCURY AND COMPOUNDS (INORGANIC)	7439-97-6 [1133]	3.0E-02		12/08				X					X	X			
			1.6E-04	12/08				X					X	X			
<i>Mercuric chloride</i>	7487-94-7	3.0E-02		12/08				✓					✓	✓			
			1.6E-04	12/08				✓					✓	✓			
METHANOL	67-56-1	4.0E+03		4/00				X									
METHYL BROMIDE (Bromomethane)	74-83-9	5.0E+00		2/00				X						X		X	
METHYL tertiary-BUTYL ETHER	1634-04-4	8.0E+03		2/00	X					X			X				
METHYL CHLOROFORM (1,1,1-Trichloroethane)	71-55-6	1.0E+03		2/00										X			
METHYL ISOCYANATE	624-83-9	1.0E+00		12/01											X	X	
METHYL MERCURY ... (see Mercury & Compounds)																	
METHYLENE CHLORIDE ^{TAC} (Dichloromethane)	75-09-2	4.0E+02		2/00			X							X			
4,4'-METHYLENE DIANILINE (AND ITS DICHLORIDE)	101-77-9	2.0E+01		12/01	X					X							
METHYLENE DIPHENYL ISOCYANATE	101-68-8	7.0E-01		1/01												X	
NAPHTHALENE	91-20-3	9.0E+00		4/00												X	
NICKEL AND COMPOUNDS ^{TAC}	7440-02-0 [1145]	1.4E-02		3/12							X					X	
			1.1E-02	3/12				X									
<i>Nickel acetate</i>	373-02-4	1.4E-02		3/12							✓					✓	
			1.1E-02	3/12				✓									
<i>Nickel carbonate</i>	3333-67-3	1.4E-02		3/12							✓					✓	
			1.1E-02	3/12				✓									
<i>Nickel carbonyl</i>	13463-39-3	1.4E-02		3/12							✓					✓	
			1.1E-02	3/12				✓									
<i>Nickel hydroxide</i>	12054-48-7	1.4E-02		3/12							✓					✓	
			1.1E-02	3/12				✓									
<i>Nickelocene</i>	1271-28-9	1.4E-02		3/12							✓					✓	
			1.1E-02	3/12				✓									

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					Alimentary	Bone	Cardiovascular	Developmental	Endocrine	Eye	Hematologic	Immune	Kidney	Nervous	Reproductive	Respiratory	Skin	
			1.0E-07	8/03	X				X	X		X				X	X	
2,3,3',4,4',5-HEXACHLOROBIPHENYL (PCB 156)	38380-08-4	1.3E+00		1/11	X				X	X		X				X	X	
			3.3E-04	1/11	X				X	X		X				X	X	
2,3,3',4,4',5'-HEXACHLOROBIPHENYL (PCB 157)	69782-90-7	1.3E+00		1/11	X				X	X		X				X	X	
			3.3E-04	1/11	X				X	X		X				X	X	
2,3',4,4',5,5'-HEXACHLOROBIPHENYL (PCB 167)	52663-72-6	1.3E+00		1/11	X				X	X		X				X	X	
			3.3E-04	1/11	X				X	X		X				X	X	
3,3',4,4',5,5'-HEXACHLOROBIPHENYL (PCB 169)	32774-16-6	1.3E-03		1/11	X				X	X		X				X	X	
			3.3E-07	1/11	X				X	X		X				X	X	
2,3,3',4,4',5,5'-HEPTACHLOROBIPHENYL (PCB 189)	39635-31-9	1.3E+00		1/11	X				X	X		X				X	X	
			3.3E-04	1/11	X				X	X		X				X	X	
POLYCHLORINATED DIBENZO-P-DIOXINS (PCDD) (Treated as 2,3,7,8-TCDD for HRA) ^{TAC} ●	1085 1086	4.0E-05		2/00	X				X	X		X				X	X	
			1.0E-08	10/00	X				X	X		X				X	X	
2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN ^{TAC}	1746-01-6	4.0E-05		2/00	X				X	X		X				X	X	
			1.0E-08	10/00	X				X	X		X				X	X	
1,2,3,7,8-PENTACHLORODIBENZO-P-DIOXIN	40321-76-4	4.0E-05		8/03	X				X	X		X				X	X	
			1.0E-08	8/03	X				X	X		X				X	X	
1,2,3,4,7,8-HEXACHLORODIBENZO-P-DIOXIN	39227-28-6	4.0E-04		2/00	X				X	X		X				X	X	
			1.0E-07	10/00	X				X	X		X				X	X	
1,2,3,6,7,8-HEXACHLORODIBENZO-P-DIOXIN	57653-85-7	4.0E-04		2/00	X				X	X		X				X	X	
			1.0E-07	10/00	X				X	X		X				X	X	
1,2,3,7,8,9-HEXACHLORODIBENZO-P-DIOXIN	19408-74-3	4.0E-04		2/00	X				X	X		X				X	X	
			1.0E-07	10/00	X				X	X		X				X	X	
1,2,3,4,6,7,8-HEPTACHLORODIBENZO-P-DIOXIN	35822-46-9	4.0E-03		2/00	X				X	X		X				X	X	
			1.0E-06	10/00	X				X	X		X				X	X	
1,2,3,4,6,7,8,9-OCTACHLORODIBENZO-P-DIOXIN	3268-87-9	1.3E-01		1/11	X				X	X		X				X	X	
			3.3E-05	1/11	X				X	X		X				X	X	

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					Alimentary	Bone	Cardiovascular	Developmental	Endocrine	Eye	Hematologic	Immune	Kidney	Nervous	Reproductive	Respiratory
POLYCHLORINATED DIBENZOFURANS (PCDF) (Treated as 2,3,7,8-TCDD for HRA) ^{TAC} ●	1080	4.0E-05		2/00	X			X	X		X			X	X	
			1.0E-08	10/00	X			X	X		X			X	X	
2,3,7,8-TETRACHLORODIBENZOFURAN	5120-73-19	4.0E-04		2/00	X			X	X		X			X	X	
			1.0E-07	10/00	X			X	X		X			X	X	
1,2,3,7,8-PENTACHLORODIBENZOFURAN	57117-41-6	1.3E-03		1/11	X			X	X		X			X	X	
			3.3E-07	1/11	X			X	X		X			X	X	
2,3,4,7,8-PENTACHLORODIBENZOFURN	57117-31-4	1.3E-04		1/11	X			X	X		X			X	X	
			3.3E-08	1/11	X			X	X		X			X	X	
1,2,3,4,7,8-HEXACHLORODIBENZOFURAN	70648-26-9	4.0E-04		2/00	X			X	X		X			X	X	
			1.0E-07	10/00	X			X	X		X			X	X	
1,2,3,6,7,8-HEXACHLORODIBENZOFURAN	57117-44-9	4.0E-04		2/00	X			X	X		X			X	X	
			1.0E-07	10/00	X			X	X		X			X	X	
1,2,3,7,8,9-HEXACHLORODIBENZOFURAN	72918-21-9	4.0E-04		2/00	X			X	X		X			X	X	
			1.0E-07	10/00	X			X	X		X			X	X	
2,3,4,6,7,8-HEXACHLORODIBENZOFURAN	60851-34-5	4.0E-04		2/00	X			X	X		X			X	X	
			1.0E-07	10/00	X			X	X		X			X	X	
1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN	67562-39-4	4.0E-03		2/00	X			X	X		X			X	X	
			1.0E-06	10/00	X			X	X		X			X	X	
1,2,3,4,7,8,9-HEPTACHLORODIBENZOFURAN	55673-89-7	4.0E-03		2/00	X			X	X		X			X	X	
			1.0E-06	10/00	X			X	X		X			X	X	
1,2,3,4,6,7,8,9-OCTACHLORODIBENZOFURAN	39001-02-0	1.3E-01		1/11	X			X	X		X			X	X	
			3.3E-05	1/11	X			X	X		X			X	X	
POTASSIUM BROMATE ... (see Bromine & Compounds)																
PROPYLENE (PROPENE)	115-07-1	3.0E+03		4/00											X	
PROPYLENE GLYCOL MONOMETHYL ETHER	107-98-2	7.0E+03		2/00	X											
PROPYLENE OXIDE	75-56-9	3.0E+01		2/00											X	

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					Alimentary	Bone	Cardiovascular	Developmental	Endocrine	Eye	Hematologic	Immune	Kidney	Nervous	Reproductive	Respiratory	Skin
SELENIUM AND COMPOUNDS (other than hydrogen selenide)	7782-49-2 [1170]	2.0E+01		12/01	X		X							X			
<i>Selenium sulfide</i>	7446-34-6	2.0E+01		12/01	✓		✓							✓			
SILICA [CRYSTALLINE, RESPIRABLE]	1175	3.0E+00		2/05												X	
STYRENE	100-42-5	9.0E+02		4/00										X			
SULFURIC ACID AND OLEUM	9961	1.0E+00		12/01												X	
<i>Sulfuric Acid</i>	7664-93-9	1.0E+00		12/01												✓	
<i>Sulfuric Trioxide</i>	7446-71-9	1.0E+00		12/01												✓	
<i>Oleum</i>	8014-95-7	1.0E+00		12/01												✓	
TOLUENE	108-88-3	3.0E+02		4/00				X						X		X	
<i>Toluene diisocyanates</i>	26471-62-5	7.0E-02		1/01												✓	
TOLUENE-2,4-DIISOCYANATE	584-84-9	7.0E-02		1/01												X	
TOLUENE-2,6-DIISOCYANATE	91-08-7	7.0E-02		1/01												X	
TRICHLOROETHYLENE ^{TAC}	79-01-6	6.0E+02		4/00						X				X			
TRIETHYLAMINE	121-44-8	2.0E+02		9/02						X							
VINYL ACETATE	108-05-4	2.0E+02		12/01												X	
VINYLDENE CHLORIDE (1,1,-Dichloroethylene)	75-35-4	7.0E+01		1/01	X												
XYLENES (mixed isomers)	1330-20-7	7.0E+02		4/00										X		X	
m-XYLENE	108-38-3	7.0E+02		4/00										X		X	
o-XYLENE	95-47-6	7.0E+02		4/00										X		X	
p-XYLENE	106-42-3	7.0E+02		4/00										X		X	

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<p>Purpose: The purpose of this reference table is to provide a quick list of all health values that have been approved by the Office of Environmental Health Hazard Assessment (OEHHA) and the Air Resources Board (ARB) for use in facility health risk assessments conducted for the AB 2588 Air Toxics "Hot Spots" Program. The OEHHA has developed and adopted new risk assessment guidelines that update and replace the California Air Pollution Control Officers Association's (CAPCOA) <i>Air Toxics "Hot Spots" Program Revised 1992 Risk Assessment Guidelines, October 1993</i>. The OEHHA has adopted four technical support documents for these guidelines, which can be found on their website (http://www.oehha.ca.gov/air/hot_spots/index.html). This table lists the OEHHA adopted inhalation and oral noncancer chronic RELs. OEHHA is still in the process of adopting new health values. Therefore, new health values will periodically be added to, or deleted from, this table. Users of this table are advised to monitor the OEHHA website (www.oehha.ca.gov) for any updates to the health values.</p> <p>May 2008 update: The Air Resources Board adopted amendments to the AB 2588 Air Toxics "Hot Spots" Emission Inventory Criteria and Guidelines Regulation (Title 17, California Code of Regulations, Section 93300.5) on November 16, 2006. The amendments became effective on September 26, 2007, after approval from the Office of Administrative Law. Under the new amendments, the substances previously listed in Appendix A-1 (<i>Substances For Which Emissions Must Be Quantified</i>) and Appendix F (<i>Criteria For Inputs For Risk Assessment Using Screening Air Dispersion Modeling</i>) of the ARB's <i>Air Toxics "Hot Spots" Emission Inventory Criteria and Guidelines (EICG) (July 1997)</i> have been removed from this table.</p>
<p>* Substances written in <i>italics</i> and with a ✓ do not have explicit OEHHA approved health values, but are included in this table to clarify applicability of OEHHA adopted health effects values to individual or grouped substances listed in the <i>Air Toxics "Hot Spots" Emission Inventory Criteria and Guidelines</i>, Appendix A-1 list of "<i>Substances For Which Emissions Must Be Quantified</i>".</p>
<p>▼ Chemical Abstract Service Number (CAS): For chemical groupings and mixtures where a CAS number is not applicable, the 4-digit code used in the <i>Air Toxics "Hot Spots" Emission Inventory Criteria and Guidelines (EICG) Report</i> is listed. The 4-digit codes enclosed in brackets [] are codes that have been phased out, but may still appear on previously reported Hot Spots emissions. For information on the origin and use of the 4-digit code, see the EICG report.</p>
<p>◆ Date Value Reviewed [Added]: This column lists the date that the health value was last reviewed by OEHHA and the Scientific Review Panel, and/or approved for use in the AB 2588 Air Toxics Hot Spots Program. If the health value is unchanged since it was first approved for use in the "Hot Spots" Program, then the date that the value was first approved for use by CAPCOA is listed within the brackets [].</p> <ul style="list-style-type: none"> February 2000, April 2000, January 2001, and December 2001 are listed for the first set of 22, the second set of 16, the third set of 22, and the fourth set of 12 noncancer chronic RELs, respectively. The chronic REL for carbon disulfide was adopted in May 2002. Chronic RELs for phosphine and triethylamine were adopted in September 2002. Chronic RELs for fluorides including hydrogen fluoride were adopted August 2003. Chronic REL for silica [crystalline respirable] was adopted February 2005. October 2000 is listed for the oral chronic RELs. For the substances identified as Toxic Air Contaminants, the Air Resources Board hearing date is listed. The date for acetaldehyde represents the date the value was approved by the Scientific Review Panel. On December 19, 2008, OEHHA adopted new chronic RELs for acetaldehyde, acrolein, arsenic, formaldehyde, manganese, and mercury. The most current health values can be found at: http://www.oehha.ca.gov/air/allrels.html. Note: 1. OEHHA presents the new oral RELs in micrograms (µg/kg-d) and we converted them to milligrams (mg/kg-d) for consistency. 2. At OEHHA's direction, the chronic oral REL for arsenic does not apply to arsine, because arsine is a gas and not particle associated. January 2011 is listed to reflect OEHHA's adoption of the World Health Organization's 2005 Toxicity Equivalency Factors for polychlorinated dibenzo-p-dioxins (PCDDs), dibenzofurans (PCDFs), and dioxin-like polychlorinated biphenyls (PCBs). See Appendix C of OEHHA's <i>Air Toxics Hot Spots Program Technical Support Document for Cancer Potencies</i> at: http://www.oehha.ca.gov/air/hot_spots/pdf/AppCdioxinTEFs013111.pdf for more information. On March 23, 2012, OEHHA adopted revised acute, 8-hour and chronic RELs for nickel and nickel compounds. The values of the RELs are listed in the table at: http://www.oehha.ca.gov/air/chronic_rels/032312CREL.html.
<p>TAC Toxic Air Contaminant: The Air Resources Board has identified this substance as a Toxic Air Contaminant.</p>
<p>Ⓜ Polychlorinated Biphenyls (speciated): Values calculated using WHO₉₇ TEF procedure. See OEHHA memo dated August 29, 2003.</p> <ul style="list-style-type: none"> Polychlorinated Dibenzo-<i>p</i>-dioxins and Polychlorinated Dibenzofurans (also referred to as chlorinated dioxins and dibenzofurans): The OEHHA has adopted the World Health Organization 1997 (WHO-₉₇) Toxicity Equivalency Factor scheme for evaluating the cancer risk due to exposure to samples containing mixtures of polychlorinated dibenzo-<i>p</i>-dioxins (PCDD) and polychlorinated dibenzofurans (PCDF) and determining cancer risks for a number of specific PCB congeners. See Appendix A of OEHHA's <i>Technical Support Document For Describing Available Cancer Potency Factors</i> for more information about the scheme. See Appendix E of OEHHA's <i>The Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments</i> for the methodology for calculating 2,3,7,8-equivalents for PCDD, PCDFs and a number of specific PCB congeners. See section 8.2.3 of OEHHA's <i>The Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments</i> for conducting health risks when total (unspeciated) chlorinated dioxins and furans are reported.

Table 3
OEHHA/ARB APPROVED CHRONIC REFERENCE EXPOSURE LEVELS AND TARGET ORGANS*

- Particulate Emissions from Diesel-Fueled Engines: The inhalation cancer potency factor and chronic REL were derived from whole diesel exhaust and should be used only for impacts from the inhalation pathway. The inhalation impacts from speciated emissions from diesel-fueled engines are already accounted for in the inhalation cancer potency factor and REL. However, at the discretion of the risk assessor, speciated emissions from diesel-fueled engines may be used to estimate acute noncancer health impacts or the contribution to cancer risk or chronic noncancer health impacts for the non-inhalation exposure pathway. See Appendix D of OEHHA's document *The Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments* for more information.