

Appendix N. Standards Used for Chemical Ranking and Exposure Analysis

Table N-1. Health-Based Standards Used to Compare and Evaluate Detected Contaminant Levels

Contaminant	¹ MCL µg/L (ppb)	⁵ Tap Water Screening Level, µg/L (ppb)	² Ambient Air Quality Standards, µg/m ³ (ppm)	³ Ambient Air Screening Level, µg/m ³ (ppm)	⁴ RfC, mg/m ³	³ Residential Soil Screening Level, mg/kg (ppm)	Potential Health Effects/ Critical Target Organs
Acenaphthalene	¹³ 2,000	370		220		3,700	
Acetaldehyde		1.7		0.87		0.11	
Acetone		610		370		1,400	
Alachlor	2			0.084		6	
Aldrin	¹⁰ 0.002	0.004		0.00039		0.029	Probable carcinogen
Alpha particles	15 pCi/L						Increased risk of cancer
Aluminum	1,000			5.1		75,000	
Anthracene		1,800		1,100		22,000	
Aroclor 1242		0.34		0.0034		0.22	
Aroclor 1254		0.34		0.0034		0.22	
Arsenic	50; 10 (as of 1/23/05)			0.00045		0.39	Reproductive/developmental endpoint; skin damage; circulatory problems; increased risk of cancer
Asbestos	¹¹ 7 MFC						
Atrazine	3			0.031		2.2	
Barium	1,000			260		5,200	Increase in blood pressure
Benz(a)anthracene		0.092		0.0092		0.62	
Benzene	1	0.34		0.23	6.0×10^{-3}	0.66	Reproductive/developmental; immune system; hematologic system (anemia); increase in cancer risk; nervous system
Benzidene	0.00029			0.000029		0.0021	
Benzo(a)pyrene	0.2	0.0092		0.00094		0.062	
Benzo(b)fluoranthene		0.092		0.0092		0.62	
Benzo(k)fluoranthene		0.056		0.017		0.062	
Beryllium	4	73	⁸ 0.01 (30-day avg)	0.0008		150	Intestinal lesions; respiratory system; immune system
Beta particles	4 millirems per year or 50 pCi/L						Increased risk of cancer
Biphenyl		300		180		3,000	
Bis(2-ethylhexyl) phthalate (DEHP)	6			48		35	Detected in Bell Canyon (not used; a byproduct)
Boron	¹⁰ 1,000	7,300		21		16,000	
Bromoform	100	805		107		62	
1,3-Butadiene	0.011			0.0096		0.0065	
Cadmium	3.7			0.0011		9	Kidney damage; respiratory system
Cadmium-109	9.52 pCi/L					0.266 pCi/g	
Carbaryl	¹⁰ 700			400		6,100	
Carbofuran	18			18		310	
Carbon tetrachloride	0.5		0.13			0.25	Reproductive/developmental; nervous system; alimentary tract; liver problems; increased risk of cancer
Cesium-137	⁹ 1.57 pCi/L			⁹ 2×10^{-7} µCi/ml		6.1 pCi/g	
Chlordane	0.1					1.6	

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Chloroform	70			0.084		0.24	Reproductive/developmental; nervous system; alimentary system; kidney development
Chloromethane		1.5		1.1		1.2	
Chromium (total)	100 (or 50 for CA water utilities)			0.00016		210	Allergic dermatitis; respiratory system
Chromium VI (~ 34% of total chromium; EPA)	50			0.000023		30	
Chrysene		0.56		0.17		3.8	
Cobalt				6.9×10 ⁻⁴		900	
Cobalt-60	⁹ 3.03 pCi/L			⁹ 5×10 ¹¹ µCi/ml		0.000901 pCi/g	
Copper	1,000					2,800	Respiratory irritation; gastrointestinal illness; liver or kidney damage; Wilson's disease
Cyanide	22			3.1		1,200	
1,1-DCA	5	810		520		510	
1,2-DCA	0.5			0.074		0.28	Increased cancer risk
1,1-DCE or vinylidene chloride	6			210		120	Liver problems
Cis-1,2-DCE	6			37		43	Liver problems
Trans-1,2-DCE	10			73		69	Liver problems
4,4-DDE		0.2		0.02		1.7	
DDT	590			0.02		1.7	
Dibenz(a,h)anthracene		24		0.00094		0.062	
Dibenzofuran				15		290	
Dibromochloromethane	60			0.08		1.1	
Dibromochloropropane	0.1	0.0092		0.00096		0.019	
1,2-Dichlorobenzene	5			210		370	
1,4-Dichlorobenzene	5			0.31		3.4	
Dichlorodifluoromethane	¹⁰ 1,000			210		94	
1,2-Dichloropropane	5			0.099		0.34	
1,3-Dichloropropene	0.5			0.48		0.78	
Dieldrin	¹⁰ 0.002	0.0042		0.00042		0.03	
Di(2-ethylhexyl) phthalate	4			5.6		410	
2,4-dimethylphenol	¹⁰ 100			73		1,200	
Di-n-butylphthalate	3,700			370		6,100	Found at Bell Canyon (not used; byproduct?)
1,4-Dioxane	¹⁰ 3			0.61		44	
Endrin	0.2			1.1		18	
Ethion	¹⁰ 4			1.8		31	
Ethylbenzene	680			1.7	1	8.9	Liver or kidney problems; endocrine system
Ethylene dibromide	0.002						
Ethylene glycol	¹⁰ 14,000			7,300		100,000	
Ethylene oxide		0.024		0.019		0.14	
Fluoranthene		1,500		150		2,300	
Fluoride	2,000					3,700	
Fluorine		240		150		2,700	
Formaldehyde	¹⁰ 100			0.15		9,200	Eye and respiratory irritation; immune system
Gamma radiation	15 pCi/L						
HCH α		0.011		0.0011		0.09	
HCH β		0.037		0.0037		0.32	

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HCHy (Lindane)	4	0.052		0.0052		0.44	
HCH (technical)		0.037		0.0038		0.32	
Heptachlor	0.01			0.0015		0.11	
Heptachlor epoxide	0.01			0.00074		0.053	
N-Heptane		350		210		110	
Hexachlorobenzene	1			0.0042		0.3	
Hexachlorocyclopentadiene	50			0.21		370	
Hydrazine		0.022		0.00039		0.16	Alimentary system; endocrine system
Hydrogen sulfide		110	0.03 ppm (42 µg/m ³) 1-hr avg.	1			Respiratory irritation; headache/nausea
Indeno(1,2,3-cd)pyrene		0.92		0.0092		0.62	
Iodine-129	⁹ 0.32 pCi/L			⁹ 4×10 ⁻¹¹ µCi/ml		0.0000276 pCi/g	
Iodine-131	⁹ 1.05 pCi/L			⁹ 2×10 ⁻¹⁰ µCi/ml		0.0833 pCi/g	
Isopropylbenzene	¹⁰ 770					160	
Lead	15		1.5 µg/m ³ 30 day avg.			130	Infants/children: delays in physical or mental development; adults: kidney problems, high blood pressure
Lithium		730				1,600	
Manganese	50			0.051		1,800	Nervous system
Mercury	2			0.31	0.0003	23	Reproductive/developme ntal endpoint; nervous system, kidney
Methoxychlor	40			18		310	
Methylene chloride		4.3		4.1		8.9	CNS (mild); cardiovascular system
4-Methylphenol		180		18		310	
Molinate	20			7.3		120	
Monochlorobenzene	30						
Naphthalene	¹⁰ 170	6.2		3.1		56	
Nickel	100			0.008		150	Respiratory irritation; immune response; targets hematopoietic system
Nitrobenzene		3.4		2.1		20	
Nitroglycerin		4.8		0.48		35	
N-Nitrosodimethylamine (NDMA)	¹⁰ 0.01			0.00014		0.0095	
4-Nitrosodiphenylamine (NDPA)		14		1.4		99	
Parathion	¹⁰ 40			22		370	
PAHs— benzo(a)pyrene	0.2			0.00092		0.0092	Reproductive difficulties; increased cancer risk
PCBs	0.5			0.0034		0.22	Chloroacne; thymus gland problems; immune deficiencies; reproductive or nervous system difficulties; increased risk of cancer
Pentachlorophenol	1			0.056		3	
Perchlorate	¹⁰ 2	307				¹⁰ 20	Thyroid interference; developmental and metabolic problems
Phenol	¹⁰ 4,200			2,200		37,000	
Plutonium-238, -239, -240	Pu238=0.36 Pu239=0.35 Pu240=0.56 pCi/L			⁹ 2×10 ⁻¹⁴ µCi/ml		³ Pu-238=0.0073 Pu-239=0.006 Pu-240=0.006 pCi/g	
Potassium-40	⁹ 1.93 pCi/L			⁹ 6×10 ⁻¹⁰ µCi/ml		0.0445 pCi/g	
N-Propylbenzene	¹⁰ 260					240	

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Pyrene		180		110		2,300	
Radium-226, -228	Ra-226=0.000823 Ra-228=0.0458 pCi/L			⁹⁰ 9×10 ⁻¹³ µCi/ml		Ra-226=0.00067 Ra-228=0.0017 pCi/g	Increased risk of cancer
Selenium	10					390	
Silver	100					390	
Silvex (2,4,5-TP)	10						
Strontium-90	0.852 pCi/L			⁹⁰ 3×10 ⁻¹¹ µCi/ml		0.00192 pCi/g	
Styrene	100			1,600		1,700	
Sulfates			25 µg/m ³ 24-hr avg.				Respiratory irritation
Tert-butyl alcohol	¹⁰ 12						
1,1,1,1-Tetrachloroethane	1						
1,1,2,2-Tetrachloroethane		0.055		0.033		0.41	
Tetrachloroethylene	5	0.66		0.67		1.5	
Thallium	2					5.2	
Thorium-228, -230, -232	²³² Th228=0.4 Th230=0.5 Th232=0.5 pCi/L			²³² 6×10 ⁻¹⁵ µCi/ml		Th-228=0.123 Th-230= 0.0105 Th232= 0.00942 pCi/g	
Toluene	150			400		520	CNS (mild); eye and respiratory irritation; kidney or liver problems
Toxaphene	5	0.061		0.006		0.44	
1,2,4-Trichlorobenzene	70			210		650	
1,1,1-Trichloroethane	200			2300		1,200	Liver, nervous, or circulatory problems
1,1,2-Trichloroethane	5			0.12		0.73	
Trichloroethylene	5	0.28		0.017	0.04	0.043	Kidney; alimentary system (liver) increased risk of cancer; eyes
Trichlorofluoromethane	150			730		390	
1,2,3-Trichloropropane	¹⁰ 0.005			0.0034		0.005	
Trichlorotrifluoroethane (freon-113)				31,000		5,600	
1,1,2-Trichloro-1,2,2-trifluoromethane	1,200						
Trihalomethanes (total)	80						
Tritium	³ 20,000 pCi/L					³ 6.01 pCi/g	
TCDD-TEQ (total) 2,3,7,8-TCDD	3×10 ⁻⁸			4.5×10 ⁻⁸		3.9×10 ⁻⁶	Alimentary system (liver); reproductive system; developmental system; endocrine system; respiratory system; hematopoietic system
Uranium-233, -234, -235, -238	U233=0.66 U234=0.67 U235=0.68 U238=0.74 pCi/L			²³⁵ 6×10 ⁻¹⁴ µCi/ml		U-233=0.00183 U-234=0.00187 U-235=0.00187 U-238=0.00206 pCi/g	Increased risk of cancer; kidney toxicity
Vanadium	¹⁰ 50	260				520	
Vinyl chloride	0.5		0.01 ppm (26 µg/m ³) 24-hr avg.		0.1	0.079	CNS (mild); eye and respiratory irritation; increased risk of cancer
Xylene	1,750			110		270	Eye and respiratory irritation; nervous system damage

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Zinc	110	11,000				22,000	
Zirconium hydride						23,000	

Notes:

¹ Maximum Contaminant Level (1/6/2003); EPA, 40 CFR Part 141.

² California Air Resources Board (1/9/2003). Used when lower than National Ambient Air Quality Standards (NAAQS) or National Emission Standards for Hazardous Air Pollutants (NESHAPs); see #4. NAAQS for Hazardous Air Pollutants (40 CFR Part 50) regulates SO₂, NO₂, CO, O₃, Pb, and PM.

³ Region 9 Human Medium Specific Screening Levels or Primary Remedial Goals (11/22/2002). Used where no California state or national standards exist.

⁴ NESHAPs, 40 CFR Part 61. Establishes standards for hazardous air pollutants for which no ambient air quality standards exist.

⁵ Region 9 Human Medium Specific Screening Levels (11/22/2002). Used as a comparison to MCL standard.

⁶ Reference dose (oral): chronic non-carcinogenic oral doses (11/22/2002). (Used as a comparison to standards; for radioactive material, refer to note #9.) Reference concentration: chronic non-carcinogenic inhalation dose (11/22/2002). (Used as comparison to air standards.)

⁷ Cancer potency factor: chronic exposure cancer risk. (Used as a comparison to standards.)

⁸ 40 CFR 61, National Emission Standards. (For iodine, gross beta, strontium-90, and tritium: 4 mrem/year/person. Other emissions are regulated by EPA/NESHAPS to the limit of 10 mrem/year/person maximum.)

⁹ EPA's Radionuclide Toxicity and Preliminary Remediation Goals for Superfund used for agricultural soil used where available, otherwise NRC (Nuclear Regulatory Commission) Regulations used (10 CFR). These are concentrations of radioactive material released in groundwater, surface water, air, soil, plants, or animals that do not exceed an annual dose equivalent of 25 mrem whole body (75 mrem max to thyroid, and 25 mrem max to any other organ (oral = o; inhalation = i; o/I = oral standard / inhalation standard).

¹⁰ California Action Levels (1/14/2003). Used only to screen high soil levels—not a risk standard.

¹¹ MFC = million fibers per liter with fiber strength > 10 microns (9/8/94).

¹² EPA Standards, 40 CFR 192, Soil Cleanup Criteria (2/12/98).

¹³ Water Health Based Limits (EPA, 1995).

Key: Abbreviations: DOE = U.S. Department of Energy; mrem = millirems; NE = not established; NPDES = National Pollutant Discharge Elimination System (regulates point source discharges of surface water to drainage channels).

Chemical Synonyms: 1,1-DCA=1,1-dichloroethane; 1,2-DCA=1,2-dichloroethane; 1,1-DCE= 1,1-dichloroethylene; cis-1,2-DCE and trans-1,2-DCE = cis/trans-1,2-dichloroethylene; PAHs = polyaromatic hydrocarbons; PCBs = polychlorinated biphenyls; 1,1,1-TCA = 1,1,1-trichloroethane; TCDD-TEQ = TCDD-toxic equivalency.

Table N-2. Standard Requirements

Standard	Citation	Requirements
National Primary Drinking Water Standards—MCL	Safe Drinking Water Act:40 CFR Part 141	Establishes health-based standards (maximum contaminant levels, or MCLs), monitoring requirements, and treatment techniques for public water systems.
National Primary and Secondary Ambient Air Quality Standards—NAAQS	Clean Air Act: 40 CFR Part 50	Establishes standards for ambient air quality to protect public health and welfare (including standards for particulate matter and lead).
National Emissions Standards for Hazardous Air Pollutants—NESHAPs	Clean Air Act: 40 CFR Part 61	Establishes emissions standards for those hazardous air pollutants for which no ambient quality standards exist, but which cause, or contribute to air pollution that may increase mortality or serious irreversible or incapacitating reversible illness.
Protection of the General Population from Release of Radioactivity	Clean Air Act: 10 CFR 61.41	Concentrations of radioactive material that may be released to the general environment must not result in an annual dose exceeding 25 mrem to the body or any organ of a member of the general public.
U.S. EPA Reference Dose—RfD	U.S. EPA, 1995	The dose of a substance or chemical that is unlikely to cause toxic effects in humans who are exposed to this dose daily over a lifetime. The RfD is expressed in units of milligrams of the substance or chemical per kilogram of body weight per day
U.S. EPA Cancer Potency Factor—CPF	U.S. EPA, 1995	“Slope factor” or “potency slope” is the measure of potency for carcinogens. This number is projected from a mathematical extrapolation model that uses data for each carcinogen. It is expressed as the cancer risk per unit dose where the dose is typically expressed in units of milligrams of the substance or chemical per kilogram of body weight per day.