

2009 Edition of the Drinking Water Standards and Health Advisories



2009 Edition of the Drinking Water Standards and Health Advisories

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The *Drinking Water Standards and Health Advisories* Tables are revised periodically by EPA's Office of Water in order to update RfD and Cancer values so that they are consistent with the most current Agency assessments of chemical contaminants that may occur in drinking water and to introduce new Health Advisories. The following information should be kept in mind when using the 2009 Edition of the Tables:

Reference dose (RfD) values are updated to reflect the values in the Integrated Risk Information System (IRIS) and the Office of Pesticide Programs (OPP) Reregistration Eligibility Decisions (RED) Documents. The Drinking Water Equivalent Level (DWEL) has been adjusted accordingly. Thus, both the RfD and DWEL in the Tables differ from the values in the Health Advisory document when the IRIS or OPP RfD is more recent than the Health Advisory document value. RfD values from IRIS that differ from the values in the Health Advisory documents are presented in **BOLD** type. Values derived from the REDs are given in **BOLD** italics. For unregulated chemicals with a recent IRIS or OPP RfD, the lifetime Health Advisory is calculated from the DWEL using the relative source contribution value published in the Health Advisory document. For regulated chemicals, no lifetime value is provided in the Tables when the revised lifetime value would differ from the Maximum Contaminant Level Goal (MCLG).

The cancer group designation or cancer classification and 10^{-4} cancer risk values reflect those presently in IRIS or in the OPP RED. New IRIS cancer designations and 10^{-4} cancer risk values are presented in **BOLD** type and those derived from the REDs are in **BOLD** italics.

The IRIS Toxicological Reviews can be accessed at: <http://www.epa.gov/IRIS>. The OPP REDs can be accessed at: <http://cfpub.epa.gov/oppref/rereg/status.cfm?show=rereg>

In some cases there is a Health Advisory value for a contaminant but there is no reference to a Health Advisory document. These Health Advisory values can be found in the Drinking Water Criteria Document for the contaminant.

With a few exceptions, the RfDs, Health Advisory, and cancer risk values have been rounded to one significant figure following the convention adopted by IRIS.

The *Drinking Water Standards and Health Advisories* Tables may be reached from the Water Science home page at: <http://www.epa.gov/waterscience>. The Tables are accessed under the Drinking Water icon.

Copies the Tables may be ordered free of charge from

SAFE DRINKING WATER HOTLINE
1-800-426-4791
Monday thru Friday, 9:00 AM to 5:30 PM EST

DEFINITIONS

The following definitions for terms used in the Tables are not all-encompassing, and should not be construed to be “official” definitions. They are intended to assist the user in understanding terms found on the following pages.

Action Level: The concentration of a contaminant which, if exceeded, triggers treatment or other requirements which a water system must follow. It is the level of lead or copper which, if exceeded in over 10% of the homes tested, triggers treatment for corrosion control.

Cancer Classification: A descriptive weight-of-evidence judgment as to the likelihood that an agent is a human carcinogen and the conditions under which the carcinogenic effects may be expressed. Under the 2005 EPA *Guidelines for Carcinogen Risk Assessment*, descriptive terms for carcinogenicity replace the earlier alpha numeric Cancer Group designations (US EPA 1986 guidelines). The suggested descriptive terms are as follows:

- Carcinogenic to humans (**H**)
- Likely to be carcinogenic to humans (**L**)
- Likely to be carcinogenic above a specified dose but not likely to be carcinogenic below that dose because a key event in tumor formation does not occur below that dose (**L/N**)
- Suggestive evidence of carcinogenic potential (**S**)
- Inadequate information to assess carcinogenic potential (**I**)
- Not likely to be carcinogenic to humans (**N**)

The letter abbreviations provided parenthetically above are now used in the Tables in place of the prior alpha numeric identifiers for chemicals that have been evaluated under the new guidelines (the 2005 guidelines or the 1996 and 1999 draft guidelines).

Cancer Group: A qualitative weight-of-evidence judgment as to the likelihood that a chemical may be a carcinogen for humans. Each chemical was placed into one of the following five categories (US EPA 1986 guidelines). The Cancer Group designations are given in the Tables for chemicals that have not yet been evaluated under the new guidelines.

Group Category

- A** Human carcinogen
- B** Probable human carcinogen:
 - B1** indicates limited human evidence
 - B2** indicates sufficient evidence in animals and inadequate or no evidence in humans
- C** Possible human carcinogen
- D** Not classifiable as to human carcinogenicity
- E** Evidence of noncarcinogenicity for humans

10⁻⁴ Cancer Risk: The concentration of a chemical in drinking water corresponding to an excess estimated lifetime cancer risk of 1 in 10,000.

Drinking Water Advisory: A nonregulatory concentration of a contaminant in water that is likely to be without adverse effects on health and aesthetics.

DWEL: Drinking Water Equivalent Level. A lifetime exposure concentration protective of adverse, non-cancer health effects, which assumes that all of the exposure to a contaminant is from drinking water.

HA: Health Advisory. An estimate of acceptable drinking water levels for a chemical substance based on health effects information; a Health Advisory is not a legally enforceable Federal standard, but serves as technical guidance to assist Federal, State, and local officials.

One-Day HA: The concentration of a chemical in drinking water that is not expected to cause any adverse noncarcinogenic effects for up to one day of exposure. The One-Day HA is normally designed to protect a 10-kg child consuming 1 liter of water per day.

Ten-Day HA: The concentration of a chemical in drinking water that is not expected to cause any adverse noncarcinogenic effects for up to ten days of exposure. The Ten-Day HA is also normally designed to protect a 10-kg child consuming 1 liter of water per day.

Lifetime HA: The concentration of a chemical in drinking water that is not expected to cause any adverse noncarcinogenic effects for a lifetime of exposure. The Lifetime HA is based on exposure of a 70-kg adult consuming 2 liters of water per day. The Lifetime HA for Group C carcinogens includes an adjustment for possible carcinogenicity.

MCLG: Maximum Contaminant Level Goal. A non-enforceable health goal which is set at a level at which no known or anticipated adverse effect on the health of persons occurs and which allows an adequate margin of safety.

MCL: Maximum Contaminant Level. The highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the MCLG as feasible using the best available analytical and treatment technologies and taking cost into consideration. MCLs are enforceable standards.

RfD: Reference Dose. An estimate (with uncertainty spanning perhaps an order of magnitude) of a daily oral exposure to the human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious effects during a lifetime.

SDWR: Secondary Drinking Water Regulations. Non-enforceable Federal guidelines regarding cosmetic effects (such as tooth or skin discoloration) or aesthetic effects (such as taste, odor, or color) of drinking water.

TT: Treatment Technique. A required process intended to reduce the level of a contaminant in drinking water.

ABBREVIATIONS

D	Draft
F	Final
I	Interim
NA	Not Applicable
NOAEL	No-Observed-Adverse-Effect Level
OPP	Office of Pesticide Programs
P	Proposed
Pv	Provisional
Reg	Regulation
TT	Treatment Technique

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Chemicals	CASRN Number	Standards			Status HA Document	Health Advisories						Cancer Descriptor ¹
		Status Reg.	MCLG (mg/L)	MCL (mg/L)		10-kg Child		RfD (mg/kg/day)	DWEL (mg/L)	Life-time (mg/L)	mg/L at 10 ⁻⁴ Cancer Risk	
						One-day (mg/L)	Ten-day (mg/L)					
ORGANICS												
Acenaphthene	83-32-9	-	-	-	-	-	-	0.06	2	-	-	-
Acifluorfen (sodium)	62476-59-9		-	-	F '88	2	2	0.01	0.4	-	0.1	L/N
Acrylamide	79-06-1	F	zero	TT ²	F '87	1.5	0.3	0.0002	0.007	-	0.0008	B2
Acrylonitrile	107-13-1		-	-	-	-	-	-	-	-	0.006	B1
Alachlor	15972-60-8	F	zero	0.002	F '88	0.1	0.1	0.01	0.4	-	0.04	B2
Aldicarb ³	116-06-3	F ⁴	0.001	0.003	F '95	0.01	0.01	0.001	0.035	0.007	-	D
Aldicarb sulfone ³	1646-88-4	F ⁴	0.001	0.002	F '95	0.01	0.01	0.001	0.035	0.007	-	D
Aldicarb sulfoxide ³	1646-87-3	F ⁴	0.001	0.004	F '95	0.01	0.01	0.001	0.035	0.007	-	D
Aldrin	309-00-2	-	-	-	F '92	0.0003	0.0003	0.00003	0.001	-	0.0002	B2
Ametryn	834-12-8	-	-	-	F '88	9	9	0.009	0.3	0.06	-	D
Ammonium sulfamate	7773-06-0	-	-	-	F '88	20	20	0.2	8	2	-	D
Anthracene (PAH) ⁵	120-12-7	-	-	-	-	-	-	0.3	10	-	-	D
Atrazine	1912-24-9	F	0.003	0.003	F '88	-	-	0.02	0.7	-	-	N
Baygon	114-26-1	-	-	-	F '88	0.04	0.04	0.004	0.1	0.003	-	C
Bentazon	25057-89-0	-	-	-	F '99	0.3	0.3	0.03	1	0.2	-	E
Benz[a]anthracene (PAH)	56-55-3	-	-	-	-	-	-	-	-	-	-	B2
Benzene	71-43-2	F	zero	0.005	F '87	0.2	0.2	0.004	0.1	-	0.1	H
Benzo[a]pyrene (PAH)	50-32-8	F	zero	0.0002	-	-	-	-	-	-	0.0005	B2
Benzo[b]fluoranthene (PAH)	205-99-2	-	-	-	-	-	-	-	-	-	-	B2
Benzo[g,h,i]perylene (PAH)	191-24-2	-	-	-	-	-	-	-	-	-	-	D
Benzo[k]fluoranthene (PAH)	207-08-9	-	-	-	-	-	-	-	-	-	-	B2
bis-2-Chloroisopropyl ether	39638-32-9	-	-	-	F '89	4	4	0.04	1	0.3	-	D
Bromacil	314-40-9	-	-	-	F '88	5	5	0.1	3.5	0.07	-	C
Bromobenzene	108-86-1	-	-	-	D '86	4	4	0.008	0.3	0.07	-	I

¹ Chemicals evaluated under the 2005 Cancer Guidelines or the 1996 or 1999 drafts are demoted by an abbreviation for their weight-of-the-evidence descriptor (see page iii). If the agency has not completed a new assessment for the chemical, the 1986 Guidelines Group designation (see page iii) is given in the Cancer Descriptor column.

² When Acrylamide is used in drinking water systems, the combination (or product) of dose and monomer level shall not exceed that equivalent to a polyacrylamide polymer containing 0.05% monomer dosed at 1 mg/L.

³ The MCL value for any combination of two or more of these three chemicals should not exceed 0.007 mg/L because of a similar mode of action.

⁴ Administrative stay of the effective date.

⁵ PAH = Polycyclic aromatic hydrocarbon.

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Chemicals	CASRN Number	Standards			Status HA Document	Health Advisories						Cancer Descriptor
		Status Reg.	MCLG (mg/L)	MCL (mg/L)		10-kg Child		RfD (mg/kg/day)	DWEL (mg/L)	Life-time (mg/L)	mg/L at 10 ⁻⁴ Cancer Risk	
						One-day (mg/L)	Ten-day (mg/L)					
Bromochloromethane	74-97-5	-	-	-	F '89	50	1	0.01	0.5	0.09	-	D
Bromodichloromethane (THM)	75-27-4	F	zero	0.08 ¹	-	1	0.6	0.003	0.1	-	0.1	L
Bromoform (THM)	75-25-2	F	zero	0.08 ¹	-	5	0.2	0.03	1	-	0.8	L
Bromomethane	74-83-9	-	-	-	D '89	0.1	0.1	0.001	0.05	0.01	-	D
Butyl benzyl phthalate	85-68-7	-	-	-	-	-	-	0.2	7	-	-	C
Butylate	2008-41-5	-	-	-	F '89	2	2	0.05	2	0.4	-	D
Carbaryl	63-25-2	-	-	-	F '88	1	1	0.01	0.4	-	4	L
Carbofuran	1563-66-2	F	0.04	0.04	F '87	-	-	0.00006	-	-	-	N
Carbon tetrachloride	56-23-5	F	zero	0.005	F '87	4	0.2	0.0007	0.03	-	0.03	B2
Carboxin	5234-68-4	-	-	-	F '88	1	1	0.1	3.5	0.7	-	D
Chloramben	133-90-4	-	-	-	F '88	3	3	0.015	0.5	0.1	-	D
Chlordane	57-74-9	F	zero	0.002	F '87	0.06	0.06	0.0005	0.02	-	0.01	B2
Chloroform (THM)	67-66-3	F	0.07	0.08 ¹	-	4	4	0.01	0.35	0.07	-	L/N
Chloromethane	74-87-3	-	-	-	F '89	9	0.4	0.004	0.1	0.03	-	D
Chlorophenol (2-)	95-57-8	-	-	-	D '94	0.5	0.5	0.005	0.2	0.04	-	D
Chlorothalonil	1897-45-6	-	-	-	F '88	0.2	0.2	0.015	0.5	-	0.15	B2
Chlorotoluene o-	95-49-8	-	-	-	F '89	2	2	0.02	0.7	0.1	-	D
Chlorotoluene p-	106-43-4	-	-	-	F '89	2	2	0.02	0.7	0.1	-	D
Chlorpyrifos	2921-88-2	-	-	-	F '92	0.03	0.03	0.0003	0.01	0.002	-	D
Chrysene (PAH)	218-01-9	-	-	-	-	-	-	-	-	-	-	B2
Cyanazine	21725-46-2	-	-	-	D '96	0.1	0.1	0.002	0.07	0.001	-	

1 1998 Final Rule for Disinfectants and Disinfection By-products: The total for trihalomethanes (THM) is 0.08 mg/L.

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Chemicals	CASRN Number	Standards			Status HA Document	Health Advisories						Cancer Descriptor
		Status Reg.	MCLG (mg/L)	MCL (mg/L)		10-kg Child		RfD (mg/kg/day)	DWEL (mg/L)	Life-time (mg/L)	mg/L at 10 ⁻⁴ Cancer Risk	
						One-day (mg/L)	Ten-day (mg/L)					
Cyanogen chloride ¹	506-77-4	-	-	-	-	0.05	0.05	0.05	2	-	-	D
2,4-D (2,4-dichlorophenoxyacetic acid)	94-75-7	F	0.07	0.07	F '87	1	0.3	0.005	0.2	-	-	D
DCPA (Dacthal)	1861-32-1	-	-	-	F '08	2	2	0.01	0.35	0.07	-	C
Dalapon (sodium salt)	75-99-0	F	0.2	0.2	F '89	3	3	0.03	0.9	0.2	-	D
Di(2-ethylhexyl)adipate	103-23-1	F	0.4	0.4	-	20	20	0.6	20	0.4	3	C
Di(2-ethylhexyl)phthalate	117-81-7	F	zero	0.006	-	-	-	0.02	0.7	-	0.3	B2
Diazinon	333-41-5	-	-	-	F '88	0.02	0.02	0.0002	0.007	0.001	-	E
Dibromochloromethane (THM)	124-48-1	F	0.06	0.08 ²	-	0.6	0.6	0.02	0.7	0.06	0.08	S
Dibromochloropropane (DBCP)	96-12-8	F	zero	0.0002	F '87	0.2	0.05	-	-	-	0.003	B2
Dibutyl phthalate	84-74-2	-	-	-	-	-	-	0.1	4	-	-	D
Dicamba	1918-00-9	-	-	-	F '88	-	-	0.5	18	4	-	N
Dichloroacetic acid	76-43-6	F	zero	0.06 ³	-	5	5	0.004	0.1	-	0.07	L
Dichlorobenzene o-	95-50-1	F	0.6	0.6	F '87	9	9	0.09	3	0.6	-	D
Dichlorobenzene — ⁴	541-73-1	-	-	-	F '87	9	9	0.09	3	0.6	-	D
Dichlorobenzene p-	106-46-7	F	0.075	0.075	F '87	11	11	0.1	4	0.075	-	C
Dichlorodifluoromethane	75-71-8	-	-	-	F '89	40	40	0.2	5	1	-	D
Dichloroethane (1,2-)	107-06-2	F	zero	0.005	F '87	0.7	0.7	-	-	-	0.04	B2
Dichloroethylene (1,1-)	75-35-4	F	0.007	0.007	F '87	2	1	0.05	2	-	0.006	S
Dichloroethylene (cis-1,2-)	156-59-2	F	0.07	0.07	F '90	4	1	0.01	0.35	0.07	-	D
Dichloroethylene (trans-1,2-)	156-60-5	F	0.1	0.1	F '87	20	1	0.02	0.7	0.1	-	D
Dichloromethane	75-09-2	F	zero	0.005	D '93	10	2	0.06	2	-	0.5	B2
Dichlorophenol (2,4-)	120-83-2	-	-	-	D '94	0.03	0.03	0.003	0.1	0.02	-	E
Dichloropropane (1,2-)	78-87-5	F	zero	0.005	F '87	-	0.09	-	-	-	0.06	B2
Dichloropropene (1,3-)	542-75-6	-	-	-	F '88	0.03	0.03	0.03	1	-	0.04	L
Dieldrin	60-57-1	-	-	-	F '88	0.0005	0.0005	0.00005	0.002	-	0.0002	B2
Diethyl phthalate	84-66-2	-	-	-	-	-	-	0.8	30	-	-	D

¹ Under review.

² 1998 Final Rule for Disinfectants and Disinfection By-products: The total for trihalomethanes is 0.08 mg/L.

³ 1998 Final Rule for Disinfectants and Disinfection By-products: The total for five haloacetic acids is 0.06 mg/L.

⁴ The values for m-dichlorobenzene are based on data for o-dichlorobenzene.

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Chemicals	CASRN Number	Standards			Status HA Document	Health Advisories						Cancer Descriptor
		Status Reg.	MCLG (mg/L)	MCL (mg/L)		10-kg Child		RfD (mg/kg/day)	DWEL (mg/L)	Life-time (mg/L)	mg/L at 10 ⁻⁴ Cancer Risk	
						One-day (mg/L)	Ten-day (mg/L)					
Diisopropyl methylphosphonate	1445-75-6	-	-	-	F '89	8	8	0.08	3	0.6	-	D
Dimethrin	70-38-2	-	-	-	F '88	10	10	0.3	10	2	-	D
Dimethyl methylphosphonate	756-79-6	-	-	-	F '92	2	2	0.2	7	0.1	0.7	C
Dimethyl phthalate	131-11-3	-	-	-	-	-	-	-	-	-	-	D
Dinitrobenzene (1,3-)	99-65-0	-	-	-	F '91	0.04	0.04	0.0001	0.005	0.001	-	D
Dinitrotoluene (2,4-)	121-14-2	-	-	-	F '08	0.5	0.5	0.002	0.1	-	0.005	L
Dinitrotoluene (2,6-)	606-20-2	-	-	-	F '08	0.4	0.4	0.001	0.04	-	0.005	L
Dinitrotoluene (2,6 & 2,4) ¹		-	-	-	F '92	-	-	-	-	-	0.005	B2
Dinoseb	88-85-7	F	0.007	0.007	F '88	0.3	0.3	0.001	0.035	0.007	-	D
Dioxane p-	123-91-1	-	-	-	F '87	4	0.4	-	-	-	0.3	B2
Diphenamid	957-51-7	-	-	-	F '88	0.3	0.3	0.03	1	0.2	-	D
Diquat	85-00-7	F	0.02	0.02	-	-	-	0.005	0.02	-	-	E
Disulfoton	298-04-4	-	-	-	F '88	0.01	0.01	0.0001	0.0035	0.0007	-	E
Dithiane (1,4-)	505-29-3	-	-	-	F '92	0.4	0.4	0.01	0.4	0.08	-	D
Diuron	330-54-1	-	-	-	F '88	1	1	0.003	0.1	-	0.2	L
Endothall	145-73-3	F	0.1	0.1	F '88	0.8	0.8	0.007	0.25	0.05	-	N
Endrin	72-20-8	F	0.002	0.002	F '87	0.02	0.005	0.0003	0.01	0.002	-	D
Epichlorohydrin	106-89-8	F	zero	TT ²	F '87	0.1	0.1	0.002	0.07	-	0.3	B2
Ethylbenzene	100-41-4	F	0.7	0.7	F '87	30	3	0.1	3	0.7	-	D
Ethylene dibromide (EDB) ³	106-93-4	F	zero	0.00005	F '87	0.008	0.008	0.009	0.3	-	0.002	L
Ethylene glycol	107-21-1	-	-	-	F '87	20	6	2	70	14	-	D
Ethylene Thiourea (ETU)	96-45-7	-	-	-	F '88	0.3	0.3	0.0002	0.007	-	0.06	B2
Fenamiphos	22224-92-6	-	-	-	F '88	0.009	0.009	0.0001	0.0035	0.0007	-	E

¹ Technical grade.

² When epichlorohydrin is used in drinking water systems, the combination (or product) of dose and monomer level shall not exceed that equivalent to an epichlorohydrin-based polymer containing 0.01% monomer dosed at 20 mg/L.

³ 1,2-dibromoethane.

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Chemicals	CAS Number	Standards			Status HA Standards	Health Advisories						Cancer Descriptor
		Status Reg.	MCLG (mg/L)	MCL (mg/L)		10-kg Child		RfD (mg/kg/day)	DWEL (mg/L)	Life-time (mg/L)	mg/L at 10 ⁻⁴ Cancer Risk	
						One-day (mg/L)	Ten-day (mg/L)					
Fluometuron	2164-17-2	-	-	-	F '88	2	2	0.01	0.5	0.09	-	D
Fluorene (PAH)	86-73-7	-	-	-	-	-	-	0.04	1	-	-	D
Fonofos	944-22-9	-	-	-	F '88	0.02	0.02	0.002	0.07	0.01	-	D
Formaldehyde	50-00-0	-	-	-	D '93	10	5	0.2	7	1	-	B1 ¹
Glyphosate	1071-83-6	F	0.7	0.7	F '88	20	20	2	70	-	-	D
Heptachlor	76-44-8	F	zero	0.0004	F '87	0.01	0.01	0.0005	0.02	-	0.0008	B2
Heptachlor epoxide	1024-57-3	F	zero	0.0002	F '87	0.01	-	0.00001	0.0004	-	0.0004	B2
Hexachlorobenzene	118-74-1	F	zero	0.001	F '87	0.05	0.05	0.0008	0.03	-	0.002	B2
Hexachlorobutadiene ²	87-68-3	-	-	-	-	0.3	0.3	0.0003	0.01	-	0.09	L
Hexachlorocyclopentadiene	77-47-4	F	0.05	0.05	-	-	-	0.006	0.2	-	-	N
Hexachloroethane	67-72-1	-	-	-	F '91	5	5	0.001	0.04	0.001	0.3	C
Hexane (n-)	110-54-3	-	-	-	F '87	10	4	-	-	-	-	I
Hexazinone	51235-04-2	-	-	-	F '96	3	2	0.05	2	0.4	-	D
HMX ³	2691-41-0	-	-	-	F '88	5	5	0.05	2	0.4	-	D
Indeno[1,2,3,-c,d]pyrene (PAH)	193-39-5	-	-	-	-	-	-	-	-	-	-	B2
Isophorone	78-59-1	-	-	-	F '92	15	15	0.2	7	0.1	4	C
Isopropyl methylphosphonate	1832-54-8	-	-	-	F '92	30	30	0.1	3.5	0.7	-	D
Isopropylbenzene (cumene)	98-82-8	-	-	-	D '87	11	11	0.1	4	-	-	D
Lindane ⁴	58-89-9	F	0.0002	0.0002	F '87	1	1	0.005	0.2	-	-	S
Malathion	121-75-5	-	-	-	F '92	0.2	0.2	0.07	2	0.5	-	S
Maleic hydrazide	123-33-1	-	-	-	F '88	10	10	0.5	20	4	-	D
MCPA ⁵	94-74-6	-	-	-	F '88	0.1	0.1	0.004	0.14	0.03	-	N
Methomyl	16752-77-5	-	-	-	F '88	0.3	0.3	0.025	0.9	0.2	-	E
Methoxychlor	72-43-5	F	0.04	0.04	F '87	0.05	0.05	0.005	0.2	0.04	-	D
Methyl ethyl ketone	78-93-3	-	-	-	F '87	75	7.5	0.6	20	4	-	D
Methyl parathion	298-00-0	-	-	-	F '88	0.3	0.3	0.0002	0.007	0.001	-	N

¹ Carcinogenicity based on inhalation exposure.

² Regulatory Determination Health Effects Support Document for Hexachlorobutadiene
(http://www.epa.gov/safewater/ccl/pdfs/reg_determine1/support_cc1_hexachlorobutadiene_healtheffects.pdf).

³ HMX = octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine.

⁴ Lindane = γ - hexachlorocyclohexane.

⁵ MCPA = 4 (chloro-2-methoxyphenoxy) acetic acid.

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Chemicals	CASRN Number	Standards			Status HA Document	Health Advisories						Cancer Descriptor
		Status Reg.	MCLG (mg/L)	MCL (mg/L)		10-kg Child		RfD (mg/kg/day)	DWEL (mg/L)	Life-time (mg/L)	mg/L at 10 ⁻⁴ Cancer Risk	
						One-day (mg/L)	Ten-day (mg/L)					
Metolachlor	51218-45-2	-	-	-	F '88	2	2	0.1	3.5	0.7	-	C
Metribuzin	21087-64-9	-	-	-	F '88	5	5	0.01	0.35	0.07	-	D
Monochloroacetic acid	79-11-8	F	0.03	0.06 ¹	-	0.2	0.2	0.01	0.35	0.07	-	I
Monochlorobenzene	108-90-7	F	0.1	0.1	F '87	4	4	0.02	0.7	0.1	-	D
Naphthalene	91-20-3	-	-	-	F '90	0.5	0.5	0.02	0.7	0.1	-	I
Nitrocellulose ²	9004-70-0	-	-	-	F '88	-	-	-	-	-	-	-
Nitroguanidine	556-88-7	-	-	-	F '90	10	10	0.1	3.5	0.7	-	D
Nitrophenol p-	100-02-7	-	-	-	F '92	0.8	0.8	0.008	0.3	0.06	-	D
N-nitrosodimethylamine		-	-	-	-	-	-	-	-	-	0.7	B₂
Oxamyl (Vydate)	23135-22-0	F	0.2	0.2	F '05	0.01	0.01	0.001	0.035	-	-	N
Paraquat	1910-42-5	-	-	-	F '88	0.1	0.1	0.0045	0.2	0.03	-	E
Pentachlorophenol	87-86-5	F	zero	0.001	F '87	1	0.3	0.03	1	-	0.03	B2
PFOA ³	335-67-1	-	-	-	Pv '09	-	-	-	-	-	-	-
PFOS ⁴	1763-23-1	-	-	-	Pv '09	-	-	-	-	-	-	-
Phenanthrene (PAH)	85-01-8	-	-	-	-	-	-	-	-	-	-	D
Phenol	108-95-2	-	-	-	D '92	6	6	0.3	11	2	-	D
Picloram	1918-02-1	F	0.5	0.5	F '88	20	20	0.02	0.7	-	-	D
Polychlorinated biphenyls (PCBs)	1336-36-3	F	zero	0.0005	D '93	-	-	-	-	-	0.01	B2
Prometon	1610-18-0	-	-	-	F '88	0.2	0.2	0.05	2	0.4	-	N
Pronamide	23950-58-5	-	-	-	F '88	0.8	0.8	0.08	3	-	0.1	B2
Propachlor	1918-16-7	-	-	-	F '88	0.5	0.5	0.05	2	-	0.1	L
Propazine	139-40-2	-	-	-	F '88	-	-	0.02	0.7	0.01	-	N
Propham	122-42-9	-	-	-	F '88	5	5	0.02	0.6	0.1	-	D
Pyrene (PAH)	129-00-0	-	-	-	-	-	-	0.03	-	-	-	D
RDX ⁵	121-82-4	-	-	-	F '88	0.1	0.1	0.003	0.1	0.002	0.03	C
Simazine	122-34-9	F	0.004	0.004	F '88	-	-	0.02	0.7	-	-	N
Styrene	100-42-5	F	0.1	0.1	F '87	20	2	0.2	7	0.1	-	C
2,4,5-T (Trichlorophenoxy-acetic acid)	93-76-5	-	-	-	F '88	0.8	0.8	0.01	0.35	0.07	-	D

¹ 1998 Final Rule for Disinfectants and Disinfection By-products: the total for five haloacetic acids is 0.06 mg/L.

² The Health Advisory Document for nitrocellulose does not include HA values and describes this compound as relatively nontoxic.

³ Perfluorooctanoic Acid. Provisional short-term value 0.0004 mg/L.

⁴ Perfluorooctane Sulfonate. Provisional short-term value 0.0002 mg/L.

⁵ RDX = hexahydro -1,3,5-trinitro-1,3,5-triazine.

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Chemicals	CASRN Number	Standards			Status HA Document	Health Advisories						Cancer Descriptor
		Status Reg.	MCLG (mg/L)	MCL (mg/L)		10-kg Child		RfD (mg/kg/day)	DWEL (mg/L)	Life-time (mg/L)	mg/L at 10 ⁻⁴ Cancer Risk	
						One-day (mg/L)	Ten-day (mg/L)					
2,3,7,8-TCDD (Dioxin)	1746-01-6	F	zero	3E-08	F '87	1E-06	1E-07	1E-09	4E-08	-	2E-08	B2
Tebuthiuron	34014-18-1	-	-	-	F '88	3	3	0.07	2	0.5	-	D
Terbacil	5902-51-2	-	-	-	F '88	0.3	0.3	0.01	0.4	0.09	-	E
Terbufos	13071-79-9	-	-	-	F '88	0.005	0.005	0.00005	0.002	0.0004	-	D
Tetrachloroethane (1,1,1,2-)	630-20-6	-	-	-	F '89	2	2	0.03	1	0.07	0.1	C
Tetrachloroethane (1,1,2,2-)	79-34-5	-	-	-	F '08	3	3	0.01	0.4	-	0.02	L
Tetrachloroethylene ¹	127-18-4	F	zero	0.005	F '87	2	2	0.01	0.5	0.01	-	-
Tetrachloroterephthalic acid	236-79-0	-	-	-	F '08	100	100	-	-	-	-	I
Trichlorofluoromethane	75-69-4	-	-	-	F '89	7	7	0.3	10	2	-	D
Toluene	108-88-3	F	1	1	D '93	20	2	0.08	3	-	-	I
Toxaphene	8001-35-2	F	zero	0.003	F '96	0.004	0.004	0.0004	0.01	-	0.003	B2
2,4,5-TP (Silvex)	93-72-1	F	0.05	0.05	F '88	0.2	0.2	0.008	0.3	0.05	-	D
Trichloroacetic acid	76-03-9	F	0.02	0.06 ²	-	3	3	0.03	1	0.02	-	S
Trichlorobenzene (1,2,4-)	120-82-1	F	0.07	0.07	F '89	0.1	0.1	0.01	0.35	0.07	-	D
Trichlorobenzene (1,3,5-)	108-70-3	-	-	-	F '89	0.6	0.6	0.006	0.2	0.04	-	D
Trichloroethane (1,1,1-)	71-55-6	F	0.2	0.2	F '87	100	40	2	70	-	-	I
Trichloroethane (1,1,2-)	79-00-5	F	0.003	0.005	F '89	0.6	0.4	0.004	0.1	0.003	0.06	C
Trichloroethylene ¹	79-01-6	F	zero	0.005	F '87	-	-	0.007	0.2	-	0.3	B2
Trichlorophenol (2,4,6-)	88-06-2	-	-	-	D '94	0.03	0.03	0.0003	0.01	-	0.3	B2
Trichloropropane (1,2,3-)	96-18-4	-	-	-	F '89	0.6	0.6	0.004	0.1	-	-	L
Trifluralin	1582-09-8	-	-	-	F '90	0.08	0.08	0.02	0.7	0.01	0.4	C
Trimethylbenzene (1,2,4-)	95-63-6	-	-	-	D '87	-	-	-	-	-	-	D
Trimethylbenzene (1,3,5-)	108-67-8	-	-	-	D '87	10	-	-	-	-	-	D
Trinitroglycerol	55-63-0	-	-	-	F '87	0.005	0.005	-	-	0.005	0.2	-
Trinitrotoluene (2,4,6-)	118-96-7	-	-	-	F '89	0.02	0.02	0.0005	0.02	0.002	0.1	C
Vinyl chloride	75-01-4	F	zero	0.002	F '87	3	3	0.003	0.1	-	0.002	H
Xylenes	1330-20-7	F	10	10	D '93	40	40	0.2	7	-	-	I

¹ Under review.

² 1998 Final Rule for Disinfectants and Disinfection By-products: The total for five haloacetic acids is 0.06 mg/L.

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Chemicals	CASRN Number	Standards			Status HA Document	Health Advisories						Cancer Descriptor
		Status Reg.	MCLG (mg/L)	MCL (mg/L)		10-kg Child		RfD (mg/kg/day)	DWEL (mg/L)	Life-time (mg/L)	mg/L at 10 ⁻⁴ Cancer Risk	
						One-day (mg/L)	Ten-day (mg/L)					
INORGANICS												
Ammonia	7664-41-7	-	-	-	D '92	-	-	-	-	30	-	D
Antimony	7440-36-0	F	0.006	0.006	F '92	0.01	0.01	0.0004	0.01	0.006	-	D
Arsenic	7440-38-2	F	zero	0.01	-	-	-	0.0003	0.01	-	0.002	A
Asbestos (fibers/l >10µm length)	1332-21-4	F	7 MFL ¹	7 MFL	-	-	-	-	-	-	700-MFL	A ²
Barium	7440-39-3	F	2	2	D '93	0.7	0.7	0.2	7	-	-	N
Beryllium	7440-41-7	F	0.004	0.004	F '92	30	30	0.002	0.07	-	-	-
Boron	7440-42-8	-	-	-	F '08	3	3	0.2	7	6	-	I
Bromate	7789-38-0	F	zero	0.01	D '98	0.2	-	0.004	0.14	-	0.005	B2
Cadmium	7440-43-9	F	0.005	0.005	F '87	0.04	0.04	0.0005	0.02	0.005	-	D
Chloramine ³	10599-90-3	F	4 ⁴	4 ⁴	D '95	-	-	0.1	3.5	3.0	-	-
Chlorine	7782-50-5	F	4 ⁴	4 ⁴	D '95	3	3	0.1	5	4	-	D
Chlorine dioxide	10049-04-4	F	0.8 ⁴	0.8 ⁴	D '98	0.8	0.8	0.03	1	0.8	-	D
Chlorite	7758-19-2	F	0.8	1	D '98	0.8	0.8	0.03	1	0.8	-	D
Chromium (total)	7440-47-3	F	0.1	0.1	F '87	1	1	0.003⁵	0.1	-	-	D
Copper (at tap)	7440-50-8	F	1.3	TT ⁶	D '98	-	-	-	-	-	-	D
Cyanide	143-33-9	F	0.2	0.2	F '87	0.2	0.2	0.02 ⁷	0.8	0.2	-	D
Fluoride	7681-49-4	F	4	4	-	- ⁸	-	0.06⁹	-	-	-	-
Lead (at tap)	7439-92-1	F	zero	TT ⁶	-	-	-	-	-	-	-	B2
Manganese	7439-96-5	-	-	-	F '04	1	1	0.14 ¹⁰	1.6	0.3	-	D
Mercury (inorganic)	7487-94-7	F	0.002	0.002	F '87	0.002	0.002	0.0003	0.01	0.002	-	D
Molybdenum	7439-98-7	-	-	-	D '93	0.08	0.08	0.005	0.2	0.04	-	D
Nickel	7440-02-0	F	-	-	F '95	1	1	0.02	0.7	0.1	-	-

¹ MFL = million fibers per liter.

² Carcinogenicity based on inhalation exposure.

³ Monochloramine; measured as free chlorine.

⁴ 1998 Final Rule for Disinfectants and Disinfection By-products: MRDLG=Maximum Residual Disinfection Level Goal; and MRDL=Maximum Residual Disinfection Level.

⁵ IRIS value for chromium VI.

⁶ Copper action level 1.3 mg/L; lead action level 0.015 mg/L.

⁷ This RfD is for hydrogen cyanide.

⁸ In case of overfeed of the fluoridation chemical see CDC Guidelines in Engineering and Administrative Recommendations on Water Fluoridation www.cdc.gov/mmwr/preview/mmwrhtml/00039178.htm. Elevated F levels ≥ 10mg/L require action by the water system operator.

⁹ Based on dental fluorosis in children, a cosmetic effect. MCLG based on skeletal fluorosis.

¹⁰ Dietary manganese. The lifetime health advisory includes a 3 fold modifying factor to account for increased bioavailability from drinking water.

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Chemicals	CASRN Number	Standards			Status HA Document	Health Advisories						Cancer Descriptor
		Status Reg.	MCLG (mg/L)	MCL (mg/L)		10-kg Child		RfD (mg/kg/day)	DWEL (mg/L)	Life-time (mg/L)	mg/L at 10 ⁻⁴ Cancer Risk	
						One-day (mg/L)	Ten-day (mg/L)					
Nitrate (as N)	14797-55-8	F	10	10	D '93	10 ¹	10 ¹	1.6	-	-	-	-
Nitrite (as N)	14797-65-0	F	1	1	D '93	1 ¹	1 ¹	0.16	-	-	-	-
Nitrate + Nitrite (both as N)		F	10	10	D '93	-	-	-	-	-	-	-
Perchlorate ²	14797-73-0	-	-	-	I '08	-	-	0.007	0.025	0.015	-	L/N
Selenium	7782-49-2	F	0.05	0.05	-	-	-	0.005	0.2	0.05	-	D
Silver	7440-22-4	-	-	-	F '92	0.2	0.2	0.005 ³	0.2	0.1 ³	-	D
Strontium	7440-24-6	-	-	-	D '93	25	25	0.6	20	4	-	D
Thallium	7440-28-0	F	0.0005	0.002	F '92	0.007	0.007	-	-	-	-	I
White phosphorous	7723-14-0	-	-	-	F '90	-	-	0.00002	0.0005	0.0001	-	D
Zinc	7440-66-6	-	-	-	D '93	6	6	0.3	10	2	-	I
RADIONUCLIDES												
Beta particle and photon activity (formerly man-made radionuclides)		F	zero	4 mrem/yr	-	-	-	-	-	-	4 mrem/yr	A
Gross alpha particle activity		F	zero	15 pCi/L	-	-	-	-	-	-	15 pCi/L	A
Combined Radium 226 & 228	7440-14-4	F	zero	5 pCi/L	-	-	-	-	-	-	-	A
Radon	10043-92-2	P	zero	300 pCi/L AMCL ⁴ 4000 pCi/L	-	-	-	-	-	-	150 pCi/L	A
Uranium	7440-61-1	F	zero	0.03	-	-	-	0.0006 ⁵	0.02	-	-	A

¹ These values are calculated for a 4-kg infant and are protective for all age groups.

² Subchronic value for pregnant women.

³ Based on a cosmetic effect.

⁴ AMCL = Alternative Maximum Contaminant Level.

⁵ Soluble uranium salts. Radionuclide Rule.

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Secondary Drinking Water Regulations

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Chemicals	CAS Number	Status	SDWR
Aluminum	7429-90-5	F	0.05 to 0.2 mg/L
Chloride	7647-14-5	F	250 mg/L
Color	NA	F	15 color units
Copper	7440-50-8	F	1.0 mg/L
Corrosivity	NA	F	non-corrosive
Fluoride	7681-49-4	F	2.0 mg/L
Foaming agents	NA	F	0.5 mg/L
Iron	7439-89-6	F	0.3 mg/L
Manganese	7439-96-5	F	0.05 mg/L
Odor	NA	F	3 threshold odor numbers
pH	NA	F	6.5 – 8.5
Silver	7440-22-4	F	0.1 mg/L
Sulfate	7757-82-6	F	250 mg/L
Total dissolved solids (TDS)	NA	F	500 mg/L
Zinc	7440-66-6	F	5 mg/L

Microbiology

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	Status Reg.	Status HA Document	MCLG	MCL	Treatment Technique
<i>Cryptosporidium</i>	F	F 01	-	TT	Systems that filter must remove 99% of <i>Cryptosporidium</i>
<i>Giardia lamblia</i>	F	F 98	-	TT	99.9% killed/inactivated
<i>Legionella</i>	F ¹	F 01	zero	TT	No limit; EPA believes that if <i>Giardia</i> and viruses are inactivated, <i>Legionella</i> will also be controlled
Heterotrophic Plate Count (HPC)	F ¹	-	NA	TT	No more than 500 bacterial colonies per milliliter.
Mycobacteria	-	F 99	-	-	-
Total Coliforms	F	-	zero	5%	No more than 5.0% samples total coliform-positive in a month. Every sample that has total coliforms must be analyzed for fecal coliforms; no fecal coliforms are allowed.
Turbidity	F	-	NA	TT	At no time can turbidity go above 5 NTU (nephelometric turbidity units)
Viruses	F ¹	-	zero	TT	99.99% killed/inactivated

¹ Regulated under the surface water treatment rule.

Drinking Water Advisory Table

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Chemicals	Status	Health-based Value	Taste Threshold	Odor Threshold
Ammonia	D '92	Not Available	30 mg/L	
Methyl tertiary butyl ether (MtBE)	F '98	Not Available	40 µg/L	20 µg/L
Sodium	F '03	20 mg/L (for individuals on a 500 mg/day restricted sodium diet).	30-60 mg/L	
Sulfate	F '03	500 mg/L	250 mg/L	

Taste Threshold: Concentration at which the majority of consumers do not notice an adverse taste in drinking water; it is recognized that some sensitive individuals may detect a chemical at levels below this threshold.

Odor Threshold: Concentration at which the majority of consumers do not notice an adverse odor in drinking water; it is recognized that some sensitive individuals may detect a chemical at levels below this threshold.