

January 29, 2018

The Vermont Department of Health (Health Department) Drinking Water Guidance document (Guidance) contains three types of values that may be used in the evaluation of drinking water supplies:

- Primary Maximum Contaminant Levels (**MCLs**) are legally enforceable standards promulgated by the United States Environmental Protection Agency (U.S. EPA) for use in the regulation of public water systems. Each value represents the highest level of a chemical that is allowed in a public drinking water supply. An MCL reflects consideration of public health concerns due to exposure via ingestion as drinking water and potentially other factors such as cost-benefit analysis, detection limit, and best available treatment technology. MCLs are derived for chemicals with carcinogenic and adverse non-carcinogenic health endpoints.
- Vermont Health Advisories (**VHAs**) are numeric guidelines researched and derived by the Health Department for chemicals that do not have a federal MCL. A VHA reflects consideration of public health concerns and analytical laboratory reporting limits. VHAs consider ingestion exposure for all chemicals as well as potential exposure via inhalation of vapors due to household water use for those chemicals that easily volatilize. VHAs are derived for chemicals with carcinogenic and adverse non-carcinogenic health endpoints. If a VHA is exceeded it does not necessarily follow that adverse health effects may occur, but exposure should be minimized while further evaluation of the water supply is conducted.
- Vermont Action Levels (**VALs**) are numeric guidelines researched and derived by the Health Department for a small number of chemicals that have MCLs but are of specific public health interest for Vermont Public Water Systems. Thus, these few chemicals have both a federal MCL and a Health Department derived value. VALs are concentrations at or above which a specific (priority) procedure will be followed in order to provide adequate protection of public health. The process employed to derive VALs is the same as for VHAs.

Collectively, these values provide critical information for use in the evaluation of potential health implications that may be associated with exposure to chemicals of concern in tap water.

Most existing Health Department derived values were developed in 2002. Since that time:

- Updated toxicity information has become available for several chemicals in the document.
- Guidance values have been requested to be developed for additional chemicals.
- There has been increased consideration of potentially sensitive subpopulations and/or life-stages.
- There has been increased consideration of potential exposure via inhalation of vapors due to routine household water use.
- Updated information has become available regarding age-specific water ingestion rates.
- Quantitative human health risk assessment methodology has continued to evolve.

The current Health Department derivation process takes these factors, as well as others, into consideration. Health Department derived values are based on an incremental lifetime cancer risk of one-in-one million for carcinogenic effects and a hazard quotient of one for systemic, non-carcinogenic effects. In those instances where a derived value is less than a reasonable analytical laboratory reporting limit, the reporting limit is used.

All Health Department guidance values available to date, both federal MCLs and Department derived values, are presented in Table 1. For the 2018 Guidance, approximately one-third of the chemicals in the 2002 Guidance were reviewed between 2015 and 2017 and revised as warranted. Chemicals with any changes since the 2002 Guidance or newly added are noted in **bold**.

In addition, U.S. EPA has also established non-mandatory National Secondary Drinking Water Regulations, referred to as secondary maximum contaminant levels (SMCLs), for 15 contaminants. These values, presented in Table 2, are non-enforceable guidelines that may assist public water systems in managing their drinking water for aesthetic considerations (such as taste, color, and odor) and/or cosmetic effects (such as tooth or skin discoloration).

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Table 1

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Chemical Name	CAS No.	VHA (µg/L) ^(a)	VAL (µg/L) ^(a)	MCL (µg/L) ^(a)
Acetone	67-64-1	949.8		
Acifluorfen, sodium	62476-59-9	4.5		
Alachlor	15972-60-8			2
Aldicarb	116-06-3			3 ^(b)
Aldicarb sulfone	1646-88-4			2 ^(b)
Aldicarb sulfoxide	1646-87-3			4 ^(b)
Aldrin	309-00-2	0.1		
Ametryn	834-12-8	246.8		
Aminoethyl ethanolamine (AEEA)	111-41-1	20		
Ammonium sulfamate	7773-06-0	914.3		
Anatoxin-a	64285-06-9	0.5		
Anthracene	120-12-7	342.9		
Antimony	7440-36-0			6
Arsenic	7440-38-2			10
Asbestos	1332-21-4			7E+6 fibers/L (longer than 10µm)
Atrazine	1912-24-9			3
Azoxystrobin	131860-33-8	558.3		
Barium	7440-39-3			2000
Bendiocarb	22781-23-3	1.7		
Benefin (Benfluralin)	1861-40-1	5.5		
Benomyl	17804-35-2	9.5		
Bensulide	741-58-2	15.6		
Bentazon	25057-89-0	453.1		
Benzene	71-43-2		0.5	5
Benzo(a)pyrene	50-32-8			0.2
Beryllium	7440-41-7			4
Bis(2-chloro-1-methyl ethyl) ether	108-60-1	45.7		
Bispyribac sodium	125401-92-5	300.2		
Boron	7440-42-8	869.6		
Boscalid	188425-85-6	185.7		
Bromacil	314-40-9	110.9		
Bromate	15541-45-4			10
Bromochloromethane	74-97-5	7.7		
Bromomethane (Methyl bromide)	74-83-9	4.8		
Bromoxynil	1689-84-5	1		
Butylate	2008-41-5	113.6		
Cadmium	7440-43-9			5

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Chemical Name	CAS No.	VHA (µg/L) ^(a)	VAL (µg/L) ^(a)	MCL (µg/L) ^(a)
Carbaryl	63-25-2	26		
Carbofuran	1563-66-2			40
Carbon tetrachloride	56-23-5		0.5	5
Carboxin	5234-68-4	22.3		
Carfentrazone ethyl	128639-02-1	47.9		
Chloramben	133-90-4	68.6		
Chlorantraniliprole	500008-45-7	5208.6		
Chlordane	12789-03-6			2
Chlorflurenol	2536-31-4	457.1		
Chlorine	7782-50-5			4000^(c)
Chlorite	7758-19-2			1000
Chlorobenzene	108-90-7			100
Chlorothalonil	1897-45-6	1.6		
Chlorotoluene (ortho)	95-49-8	100		
Chlorotoluene (para)	106-43-4	100		
Chlorpyrifos	2921-88-2	20		
Chromium (total)	7440-47-3			100
Cimectacarb	95266-40-3	1050		
Clopyralid	1702-17-6	330		
Copper (at tap)	7440-50-8	1300 ^(d)		
Cyanazine	21725-46-2	1		
Cyanide	143-33-9			200
Cylindrospermopsin	NA	0.5		
Dacthal	1861-32-1	7		
Dalapon	75-99-0			200
Dazomet	533-74-4	88		
Di(2-ethylhexyl)adipate	103-23-1			400
Di(2-ethylhexyl)phthalate	117-81-7			6
Diazinon	333-41-5	0.6		
Dibromochloropropane	96-12-8		0.02	0.2
Dicamba	1918-00-9	189		
Dichlorobenzene (meta)	541-73-1	600 ^(e)		
Dichlorobenzene (ortho)	95-50-1			600
Dichlorobenzene (para)	106-46-7			75
Dichlorodifluoromethane	75-71-8	1000		
Dichloroethane (1,1)	75-34-3	70		
Dichloroethane (1,2)	107-06-2		0.5	5
Dichloroethene (1,1)	75-35-4			7
Dichloroethene (cis-1,2)	156-59-2			70

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Chemical Name	CAS No.	VHA (µg/L) ^(a)	VAL (µg/L) ^(a)	MCL (µg/L) ^(a)
Dichloroethene (trans-1,2)	156-60-5			100
Dichlorophenoxyacetic acid (2,4)	94-75-7			70
Dichloroprop	120-36-5	140		
Dichloropropane (1,2)	78-87-5		0.5	5
Dichloropropene (1,3)	542-75-6	0.5		
Dieldrin	60-57-1	0.02		
Diethylenetriamine (DETA)	111-40-0	5154		
Dimethrin	70-38-2	2000		
Dinoseb	88-85-7			7
Dioxane (1,4)	123-91-1	0.3		
Diphenamid	957-51-7	200		
Diquat	85-00-7			20
Disulfoton	298-04-4	0.3		
Diuron	330-54-1	10		
Endothall	145-73-3			100
Endrin	72-20-8			2
Erioglaucine	2650-18-2	7211.4		
Ethofumesate	26225-79-6	280		
Ethoprop	13194-48-4	1		
Ethylbenzene	100-41-4			700
Ethylene dibromide	106-93-4			0.05
Ethylene glycol	107-21-1	7000		
Ethylene thiourea	96-45-7	5		
Etridiazole	2593-15-9	1		
Fenamiphos	22224-92-6	2		
Fenarimol	60168-88-9	630.5		
Fluometuron	2164-17-2	90		
Fluoranthene	206-44-0	280		
Fluorene	86-73-7	280		
Fluoride	7681-49-4			4000
Flurprimidol	56425-91-3	700		
Flutolanil	66332-96-5	1400		
Fluvalinate	69409-94-5	70		
Fluxapyroxad	907204-31-3	44.4		
Fonofos	944-22-9	10		
Formaldehyde	50-00-0	1000		
Fosetyl-al	39148-24-8	2343		
Glufosinate-ammonium	77182-82-2	20		

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Chemical Name	CAS No.	VHA (µg/L) ^(a)	VAL (µg/L) ^(a)	MCL (µg/L) ^(a)
Glyphosate	1071-83-6			700
Gross Alpha (adjusted)	NA			15 pCi/L ^(f)
Haloacetic acids (total)	NA			60
Halofenozide	112226-61-6	46		
Halosulfuron-methyl	100784-20-1	990		
Heptachlor	76-44-8			0.4
Heptachlor epoxide	1024-57-3			0.2
Hexachlorobenzene	118-74-1		0.1	1
Hexachlorobutadiene	87-68-3	1		
Hexachlorocyclopentadiene	77-47-4			50
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	121-82-4	0.3		
Hexane (n)	110-54-3	420		
Hexazinone	51235-04-2	200		
Imidacloprid	138261-41-3	93		
Iprodione	36734-19-7	280		
Isophorone	78-59-1	100		
Isoxaben	82558-50-7	175		
Lead (at tap)	7439-92-1	15 ^(d)		
Lead	7439-92-1	1		
Lindane	58-89-9			0.2
Maleic hydrazide	123-33-1	4000		
Maneb	12427-38-2	35		
Manganese	7439-96-5	300		
MCPA [4(chloro-2-methoxyphenoxy) acetic acid]	94-74-6	10		
Mecoprop	93-65-2	35		
Mercury (inorganic)	7487-94-7			2
Metalaxyl	57837-19-1	350		
Methomyl	16752-77-5	200		
Methoxychlor	72-43-5			40
Methyl ethyl ketone	78-93-3	4200		
Methyl isobutyl ketone	108-10-1	560		
Methyl parathion	298-00-0	2		
Methyl tert butyl ether (MTBE)	1634-04-4	11.3		
Methylene chloride	75-09-2			5
Metolachlor	51218-45-2	70		
Metribuzin	21087-64-9	32.5		
Microcystin	NA	0.16		
Molybdenum	7439-98-7	40		
Monochloramine	10599-90-3			4000^(e)
Myclobutanil	88671-89-0	120		

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Chemical Name	CAS No.	VHA (µg/L) ^(a)	VAL (µg/L) ^(a)	MCL (µg/L) ^(a)
Naphthalene	91-20-3	20		
Napropamide	15299-99-7	70		
Nickel	7440-02-0	100		
Nitrate (as N)	14797-55-8			10000
Nitrates/Nitrites (total)	NA			10000
Nitrite (as N)	14797-65-0			1000
O-Phenylphenol (OPP)	90-43-7	764		
Octahydro-1,3,5,7-tetranitro-1,2,3,5,7-tetrazocine (HMX)	2691-41-0	57.1		
Oxamyl	23135-22-0			200
Paclobutrazol	76738-62-0	455		
Paraquat	1910-42-5	30		
Pendimethalin	40487-42-1	280		
Pentachloronitrobenzene	82-68-8	6		
Pentachlorophenol	87-86-5		0.1	1
Pentaerythriol tetranitrate (PETN)	78-11-5	2.3		
Perchlorate	1479-73-0	2.2		
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	0.02^(g)		
Perfluorooctanoic acid (PFOA)	335-67-1	0.02^(g)		
Phenol	108-95-2	2100		
Picloram	1918-02-1			500
Polychlorinated Biphenyls	1336-36-3			0.5
Prometon	1610-18-0	100		
Pronamide	23950-58-5	50		
Propachlor	1918-16-7	90		
Propamocarb hydrochloride	25606-41-1	924		
Propazine	139-40-2	10		
Propham	122-42-9	100		
Propiconazole	60207-90-1	104		
Propoxur (Baygon)	114-26-1	6.2		
Quinclorac	84087-01-4	369		
Radium ^{226 & 228}	7440-14-4			5 pCi/L
Radon	010043-92-2	4000 pCi/L ^(h)		
Selenium	7782-49-2			50
Simazine	122-34-9			4
Styrene	100-42-5			100
Tall oil hydroxyethyl imidazoline	61791-39-7	118		
Tartrazine	1934-21-0	1904.8		
Tebuthiuron	34014-18-1	500		
Terbacil	5902-51-2	90		
Terbufos	13071-79-9	0.9		
Tetrachlorodibenzo-p-dioxin (2,3,7,8)	1746-01-6			3.00E-05

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Chemical Name	CAS No.	VHA (µg/L) ^(a)	VAL (µg/L) ^(a)	MCL (µg/L) ^(a)
Tetrachloroethane (1,1,1,2)	630-20-6	70		
Tetrachloroethylene	127-18-4		1	5
Thallium	7440-28-0			2
Thiophanate methyl	23564-05-8	560		
Thiram	137-26-8	35		
Toluene	108-88-3			1000
Toxaphene	8001-35-2			3
Triadimefon	43121-43-3	10		
Triazole (1,2,4)	288-88-0	20		
Triazole metabolites (Conjugated)	86362-20-1, 28711-29-7 and Triazolylpyruvic acid	102.9⁽ⁱ⁾		
Trichlorfon	52-68-6	1.5		
Trichlorobenzene (1,2,3)	87-61-6	0.9		
Trichlorobenzene (1,2,4)	120-82-1			70
Trichlorobenzene (1,3,5)	108-70-3	40		
Trichloroethane (1,1,1)	71-55-6			200
Trichloroethane (1,1,2)	79-00-5			5
Trichloroethylene	79-01-6		0.5	5
Trichlorofluoromethane	75-69-4	2100		
Trichlorophenoxyacetic acid (2,4,5)	93-76-5	70		
Trichlorophenoxypropionic acid (2,4,5)	93-72-1			50
Trichloropropane (1,2,3)	96-18-4	0.02		
Triclopyr	55335-06-3	487		
Trifloxystrobin	141517-21-7	410		
Trifluralin	1582-09-8	5		
Trihalomethanes (total)	NA			80
Trimethyl benzene (1,2,3)	526-73-8	23.2^(j)		
Trimethyl benzene (1,2,4)	95-63-6	23.2^(j)		
Trimethyl benzene (1,3,5)	108-67-8	23.2^(j)		
Trinitrotoluene (2,4,6) (TNT)	118-96-7	0.8		
Triticonazole	131983-72-7	194.3		
Uranium	7440-61-1			20 ^(k)
Vinyl chloride	75-01-4		0.5	2
Xylenes	1330-20-7			10000
Zineb	142-14-3	350		

Notes:

BOLD - value revised from 2002 guidance or newly added

Value adjusted to reflect analytical laboratory reporting limit

NA - Not Applicable as represents more than one analyte and for microcystin and cylindrospermopsin many congeners may react in the assay

(a) - All units are micrograms per Liter (µg/L) [parts per billion (ppb)] unless otherwise noted

(b) - MCL of 7 µg/L for any combination of Aldicarb, Aldicarb sulfone and Aldicarb sulfoxide

(c) - EPA 1998 Final Rule for Disinfectants and Disinfection By-products Maximum Residual Disinfection (MRDL)

(d) - Copper and Lead are regulated using "Action Levels" (40CFR141.8)

(e) - Value for meta based on data for ortho dichlorobenzene

(f) - Adjusted includes Ra²²⁶, excludes Uranium and Radon

(g) - Sum of PFOS and PFOA not to exceed 0.02 µg/L

(h) - Water results should be interpreted after air results are obtained

(i) - Sum of conjugated triazole metabolites (Triazolylalanine, Triazolylacetic acid, and Triazolylpyruvic acid) not to exceed 102.9 µg/L

(j) - Sum of 1,2,3-TMB, 1,2,4-TMB and 1,3,5-TMB isomers not to equal or exceed 23.2 µg/L

(k) - Uranium MCL is the Vermont MCL. Federal MCL is 30 µg/L.

**Vermont Department of Health
Table 2**

U.S. EPA Secondary Maximum Contaminant Levels^(a)

Chemical Name	CAS No.	SMCL (µg/L)^(b)
Aluminum	7429-90-5	50-200
Chloride	7647-14-5	250000
Color	NA	15 Color Units
Copper	7440-50-8	1000
Corrosivity	NA	non-corrosive
Fluoride	7681-49-4	2000
Foaming Agents	NA	500
Iron	7439-89-6	300
Manganese	7439-96-5	50
Odor	NA	3 threshold odor number
pH	NA	6.5-8.5 ^(c)
Silver	7440-22-4	100
Sodium	7440-23-5	250000 ^(d)
Sulfate	7757-82-6	250000
Total Dissolved Solids	NA	500000
Zinc	7440-66-6	5000

Notes:

NA - Not Applicable

SMCL - U.S. EPA Secondary Maximum Contaminant Level

(a) - The U.S. EPA MCLs presented in Attachment 1 are Primary Maximum Contaminant Levels. For reference purposes, the U.S. EPA Secondary MCLs above are used in regulation of contaminants in drinking water that primarily affect the aesthetic qualities relating to the public acceptance of drinking water (40CFR§143.3). Refer to Chapter 21, the Water Supply Rule, Subchapter 6.13. SMCLs accessed online 1/25/2018 at <https://www.epa.gov/dwstandardsregulations/secondary-drinking-water-standards-guidance-nuisance-chemicals#what-are-secondary>

(b) - All units are micrograms per Liter (µg/L) [parts per billion (ppb)] unless otherwise noted

(c) - pH standard units

(d) - Vermont Secondary Maximum Contaminant Level; Vermont Water Supply Rule 2010, Table 6-2.