

**SPRING 2009**

**STANDARDS AND GUIDELINES**

**FOR**

**CONTAMINANTS IN MASSACHUSETTS DRINKING WATERS**

Commonwealth of Massachusetts  
Executive Office of Energy and Environmental Affairs  
Department of Environmental Protection  
Office of Research and Standards  
One Winter Street  
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COMMONWEALTH OF MASSACHUSETTS  
EXECUTIVE OFFICE OF ENERGY & ENVIRONMENTAL AFFAIRS  
**DEPARTMENT OF ENVIRONMENTAL PROTECTION**

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**TO:** Interested Parties

**FROM:** Carol Rowan West, Director, Office of Research and Standards

**DATE:** *Spring 2009*

**RE:** Massachusetts Drinking Water Standards and Guidelines

Attached is the latest list of the Massachusetts Drinking Water Standards and Guidelines. The last issue was sent out in May of 2008. There are no changes in this list from its last edition.

The standards and guidelines may not apply to all contaminant situations, so I urge you to continue to contact the Office of Research and Standards (ORS) with any questions regarding the application or interpretation of this information. Also, when a contaminant of interest is not on the list, please contact ORS for guidance (phone number 617-292-5998; email: [michael.hutcheson@state.ma.us](mailto:michael.hutcheson@state.ma.us)).

The list of Massachusetts standards and guidelines is available on the MassDEP Web Page at <http://www.mass.gov/dep/water/drinking/standards/dwstand.htm> with links to chemical-specific documentation. Users have the option of clicking on an individual chemical in the list to see the basis for the derivation of the drinking water criterion, along with other pertinent information. The Web Page also provides limits for some routinely used drinking water treatment chemicals. This information is presented in the Department's Office of Research and Standards (ORS) documentation for the Immediate Action Levels for Water Treatment Plant Chemicals located at <http://www.mass.gov/dep/water/laws/ialwtpps.htm>.



## **I. Introduction**

The Drinking Water List of Standards and Guidelines is a convenient compendium of guidance values available for evaluating contaminants in drinking water in Massachusetts. The list is designed to be used by individuals or groups concerned with the integrity of drinking water, for example, water suppliers, homeowners, environmental groups, government regulators, boards of health, or private consultants.

Under the Safe Drinking Water Act (SDWA), a state may be granted primacy for implementing the provisions of the SDWA. The Massachusetts Department of Environmental Protection (MassDEP) has primacy for implementation. As part of that primacy, MassDEP is responsible for ensuring the quality of Massachusetts public drinking waters.

The Office of Research and Standards (ORS) of the MassDEP is charged with establishing protective public health standards and/or guidelines for contaminants in drinking water. This mission may involve adoption or revision of standards established by the EPA, or ORS may adopt a more stringent standard or guideline based on an independent review of primary or secondary data.

## **II. Standards**

The Massachusetts MCLs listed in the drinking water regulations (310 CMR 22.00), as well as the promulgated MCLs set by the EPA which have become effective, constitute the Massachusetts Drinking Water Standards, which are listed as MMCLs on the Drinking Water List. The standards are enforced by the Drinking Water Program (DWP). The drinking water regulations have been updated to reflect the latest changes in the drinking water standards. The regulations were last promulgated on 1 November 2006.

For contaminant concentration limits for drinking water to be termed standards or Massachusetts Maximum Contaminant Levels (MMCL) in Massachusetts, one of three events must occur. The promulgated EPA Maximum Contaminant Levels (MCLs) printed in the Federal Register must be formally adopted by the Massachusetts Department of Environmental Protection (MassDEP) Drinking Water Program (DWP); the date listed in the Federal Register for the MCLs to be effective must have passed; or, MassDEP, pursuant to the requirements of M.G.L. Chapter 30A, will hold public hearings on proposed revisions to 310 CMR 22.00 to set new MMCLs.

The MMCLs listed in 310 CMR 22.00 apply to water that is delivered to any user of a public water system as defined in 310 CMR 22.02. Please refer to the regulations for more specific definitions and applications. Private residential wells are not subject to the requirements of 310 CMR 22.00. However, these drinking water standards are recommended for the evaluation of private drinking water and are often used to evaluate private residential contamination, especially in Federal Superfund and M.G.L Chapter 21E activities.

### III. Guidelines

ORS issues guidance for chemicals other than those with Massachusetts MCLs in drinking water. Standards promulgated by the EPA but not yet effective may be included on the Guidelines list. These values are derived based on a review and evaluation of all available data for the chemical of interest.

ORS uses methodology similar to that used by the EPA's Office of Groundwater and Drinking Water (OGWDW) when setting guidelines for chemicals in drinking water. Concentrations of chemicals having evidence of carcinogenicity are minimized as much as feasible; therefore, guidelines are set at a target excess lifetime cancer risk of one in one million ( $1 \times 10^{-6}$ ) or at the lowest practical quantitation limit (PQL) if the concentration at  $1 \times 10^{-6}$  is below the PQL. This practice applies to chemicals classified as A or B carcinogens under the old cancer classification scheme of EPA (US EPA, 1986). Class C carcinogens are individually evaluated for a decision regarding whether to set the guidelines on cancer effects. For newly classified carcinogens under EPA's new Carcinogen Risk Assessment Guidelines (US EPA, 2005), MassDEP will follow EPA OGWDW's procedures for development of guidance.

To derive guidance for potential non-carcinogenic effects for a chemical, ORS applies a percentage (usually 20%) to published or derived route-specific reference doses and then uses standard exposure assumptions to convert the dose to a drinking water concentration. This practice allows for the possibility of human exposures from sources other than drinking water.

The standards and guidelines published in this list are derived for the specific circumstances associated with drinking water. The assumptions used in establishing the numbers are therefore specific to drinking water situations and discretion must be exercised when using the guidance for situations other than contaminated drinking water. Please refer any questions regarding the proper use of the numbers issued in this list to ORS at 617-292-5998.

A more detailed description of the methodology used by ORS to derive water guidance can be found in Guide to the Regulation of Toxic Chemicals In Massachusetts Waters (ORS 1990), available on MassDEP's website at: <http://mass.gov/dep/water/laws/dwguide.doc>.

#### IV. Spring 2009 Drinking Water Standards and Guidelines Lists Update

**No Changes from the 2008 List have been made to the 2009 List.**

#### V. References

Office of Research and Standards, 1990. *Guide to the Regulation of Toxic Chemicals in Massachusetts Waters*. Massachusetts Department of Environmental Protection. Boston, MA.

USEPA (U.S. Environmental Protection Agency). 2005. Guidelines for Carcinogen Risk Assessment. EPA/630/P-03/001F. Risk Assessment Forum. U.S. Environmental Protection Agency. Washington, D.C.

USEPA (U.S. Environmental Protection Agency). 1986. Guidelines for Carcinogen Risk Assessment. Risk Assessment Forum. U.S. Environmental Protection Agency. Washington, D.C.

**SPRING 2009****MASSACHUSETTS DRINKING WATER STANDARDS – Inorganic and Organic Chemicals**

Please note that drinking water guidance is contained in five separate lists, in the following order:  
 (1) Massachusetts Maximum Contaminant Levels – Inorganic/Organics; (2) Massachusetts Maximum Contaminant Levels – Radionuclides;  
 (3) Massachusetts Maximum Contaminant Levels – Biologicals; (4) Massachusetts Drinking Water Guidelines;  
 (5) Secondary Maximum Contaminant Levels

SUBSTANCE	CASRN	MMCL (mg/L)
Acrylamide <sup>1</sup>	79061	Treatment Technique
Alachlor	15972608	0.002
Antimony	7440360	0.006
Arsenic	7440382	0.010
Asbestos <sup>2</sup>	1332214	7 million fibers/liter
Atrazine	1912249	0.003
Barium	7440393	2
Benzene	71432	0.005
Benzo(a)pyrene	50328	0.0002
Beryllium	7440417	0.004
Bromate	15541454	0.010
Cadmium	7440439	0.005
Carbofuran	1563662	0.04
Carbon tetrachloride	56235	0.005
Chloramines (as Cl <sub>2</sub> )	N/A	4.0 (MRDL <sup>3</sup> )
Chlordane	57749	0.002
Chlorine (as Cl <sub>2</sub> )	7782505	4.0 (MRDL)
Chlorine dioxide (as ClO <sub>2</sub> )	10049044	0.8 (MRDL)
Chlorite	7758192	1.0
Chlorobenzene	108907	0.1
Chromium (total)	7440473	0.1
Copper	7440508	Treatment Technique, 1.3 (Action Level)
Cyanide (as free cyanide)	57125	0.2
2,4-D (2,4-Dichlorophenoxyacetic acid)	94757	0.07

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SUBSTANCE	CASRN	MMCL (mg/L)
Dalapon	75990	0.2
1,2-Dibromo-3-chloropropane (DBCP)	96128	0.0002
1,2-Dichlorobenzene (o-DCB)	95501	0.6
1,4-Dichlorobenzene (p-DCB) <sup>4</sup>	106467	0.005
1,2-Dichloroethane	107062	0.005
1,1-Dichloroethylene	75354	0.007
1,2-Dichloroethylene( <i>cis</i> )	156592	0.07
1,2-Dichloroethylene( <i>trans</i> )	156605	0.1
Dichloromethane	75092	0.005
1,2-Dichloropropane	78875	0.005
Di(2-ethylhexyl)-adipate	103231	0.4
Di(2-ethylhexyl)-phthalate	117817	0.006
Dinoseb	88857	0.007
Diquat	85007	0.02
Endothall	145733	0.1
Endrin	72208	0.002
Epichlorohydrin <sup>5</sup>	106898	Treatment Technique
Ethylbenzene	100414	0.7
Ethylene dibromide (EDB) <sup>6</sup>	106934	0.00002
Fluoride	7782414	4.0
Glyphosate	1071536	0.7
Haloacetic acids (HAA5) (for chlorinated supplies only): including monochloroacetic acid, dichloroacetic acid, trichloroacetic acid, bromoacetic acid and dibromoacetic acid	N/A	0.060
Heptachlor	76448	0.0004

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SUBSTANCE	CASRN	MMCL (mg/L)
Heptachlor epoxide	1024573	0.0002
Hexachlorobenzene	118741	0.001
Hexachlorocyclopentadiene	77474	0.05
Lead	7439921	Treatment Technique, 0.015 (Action Level)
Lindane	58899	0.0002
Mercury (inorganic)	7439976	0.002
Methoxychlor	72435	0.04
Nitrate (As N)	14797558	10
Nitrate/Nitrite (total)	N/A	10
Nitrite (As N)	14797650	1
Oxamyl (Vydate)	23135220	0.2
PCBs (Polychlorinated biphenyls) <sup>7</sup>	1336363	0.0005
Pentachlorophenol	87865	0.001
Perchlorate <sup>8</sup>		0.002
Picloram	1918021	0.5
Selenium	7782492	0.05
Simazine	122349	0.004
Styrene	100425	0.1
2,3,7,8-TCDD (Dioxin)	1746016	$3 \times 10^{-8}$
Tetrachloroethylene	127184	0.005
Thallium	7440280	0.002
Toluene	108883	1

**SPRING 2009****MASSACHUSETTS DRINKING WATER STANDARDS – Inorganic and Organic Chemicals**

Total trihalomethanes (for chlorinated supplies only)	N/A	0.080
Including: Chloroform	67663	N/A <sup>9</sup>
Chlorodibromomethane	124481	N/A
Bromodichloromethane	75274	N/A
Bromoform	75252	N/A
Toxaphene	8001352	0.003
2,4,5-TP (Silvex)	93721	0.05
1,2,4-Trichlorobenzene	120821	0.07
1,1,1-Trichloroethane	71556	0.2
1,1,2-Trichloroethane	79005	0.005
Trichloroethylene	79016	0.005
Vinyl chloride	75014	0.002
Xylenes (total)	1330207	10

<sup>1</sup> No numerical MCL is provided for these compounds. If detected, a treatment technique is specified. Each water system must certify, in writing, to the state (using third-party or manufacturer's certification) that when acrylamide and epichlorohydrin are used in drinking water systems, the combination (or product) of dose and monomer level does not exceed the levels specified, as follows:

- Acrylamide = 0.05% dosed at 1 mg/L (or equivalent)
- Epichlorohydrin = 0.01% dosed at 20 mg/L (or equivalent)

<sup>2</sup> For fibers longer than 10 microns.

<sup>3</sup> MRDL = maximum residual disinfectant level - the highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.

<sup>4</sup> The MMCL for this chemical is more stringent than the federal MCL.

<sup>5</sup> See footnote 1 above.

<sup>6</sup> See footnote 4 above.

<sup>7</sup> The MCL for PCBs applies to the decachlorobiphenyl species.

<sup>8</sup> The MCL is directed at the sensitive subgroups of pregnant women, infants, children up to the age of 12, and individuals with hypothyroidism. They should not consume drinking water containing concentrations of perchlorate exceeding 2 µg/L. MassDEP recommends that no one consume water containing perchlorate concentrations greater than 18 µg/L.

<sup>9</sup> Not applicable

**SPRING 2009****MASSACHUSETTS DRINKING WATER STANDARDS – Radionuclides**

Please note that drinking water guidance is contained in five separate lists, in the following order:  
(1) Massachusetts Maximum Contaminant Levels – Inorganic/Organics; (2) Massachusetts Maximum Contaminant Levels – Radionuclides;  
(3) Massachusetts Maximum Contaminant Levels – Biologicals; (4) Massachusetts Drinking Water Guidelines;  
(5) Secondary Maximum Contaminant Levels

<b>SUBSTANCE</b>	<b>CASRN</b>	<b>TYPE OF GUIDANCE</b>	<b>MMCL or ORSG (mg/L)</b>
Beta particle and photon radioactivity	N/A	MMCL	concentration which produces an annual dose of 4 millirem/yr
Gross alpha radiation	N/A	MMCL	15 pCi/l
Radium (226 + 228)	7440144	MMCL	5 pCi/l
Radon-222 <sup>1</sup>	14859677	ORSG	10,000 pCi/l
Uranium	7440611	MMCL	0.030

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<sup>1</sup> Exceedance of this guideline indicates that air sampling for Radon-222 should be done. EPA proposed guidelines for radon (64 FR 211; Tuesday, November 2, 1999) which have not been finalized.

**SPRING 2009****MASSACHUSETTS DRINKING WATER STANDARDS – Biologicals**

Please note that drinking water guidance is contained in five separate lists, in the following order:  
(1) Massachusetts Maximum Contaminant Levels – Inorganic/Organics; (2) Massachusetts Maximum Contaminant Levels – Radionuclides;  
(3) Massachusetts Maximum Contaminant Levels – Biologicals; (4) Massachusetts Drinking Water Guidelines;  
(5) Secondary Maximum Contaminant Levels

SUBSTANCE	CASRN	MMCL
<i>Cryptosporidium</i>	N/A	Treatment Technique
<i>Giardia lamblia</i>	N/A	Treatment Technique
Heterotrophic plate count	N/A	Treatment Technique
<i>Legionella</i>	N/A	Treatment Technique
Total coliform bacteria (including fecal coliform and <i>E. coli</i> )	N/A	refer to 310 CMR 22.05
Turbidity	N/A	Treatment Technique
Viruses (enteric)	N/A	Treatment Technique

**SPRING 2009**  
**MASSACHUSETTS DRINKING WATER GUIDELINES**

Please note that drinking water guidance is contained in five separate lists, in the following order:  
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SUBSTANCE	CASRN	ORSG (mg/L)
Acetone	67641	6.3
Aldicarb <sup>1</sup>	116063	0.003
Aldicarb sulfone <sup>2</sup>	1646884	0.002
Aldicarb sulfoxide <sup>3</sup>	1646873	0.004
Bromomethane	74839	0.01
Chloroform <sup>4</sup>	67663	0.07
Dichlorodifluoromethane	75718	1.4
1,1-Dichloroethane	75343	0.07
1,3-Dichloropropene	542756	0.0004
1,4-Dioxane	123911	0.003
Ethylene glycol	107211	14
Methyl ethyl ketone	78933	4.0
Methyl isobutyl ketone	108101	0.35
Methyl <i>tertiary</i> butyl ether <sup>5</sup>	1634044	0.07
Metolachlor	51218452	0.1
Naphthalene	91203	0.140
Nickel <sup>6</sup>	7440020	0.1
n-Nitrosodimethylamine (NDMA)	62759	0.00001

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MASSACHUSETTS DRINKING WATER GUIDELINES**

SUBSTANCE	CASRN	ORSG (mg/L)
Petroleum hydrocarbons <sup>7</sup>	N/A	
TPH		0.2
<u>Aliphatics</u>		
C <sub>5</sub> -C <sub>8</sub>		0.3
C <sub>9</sub> -C <sub>12</sub> <sup>8</sup>		0.7
C <sub>9</sub> -C <sub>18</sub> <sup>9</sup>		0.7
C <sub>19</sub> -C <sub>36</sub>		14.0
<u>Aromatics</u>		
C <sub>6</sub> -C <sub>8</sub>		use guidance for individual chemicals
C <sub>9</sub> -C <sub>10</sub>		0.2
C <sub>11</sub> -C <sub>22</sub>	0.2	
Sodium <sup>10</sup>	7440235	20
Tertiary-Amyl Methyl Ether (TAME)	994058	0.09
Tertiary Butyl Alcohol (TBA)	75650	0.12
Tetrahydrofuran	109999	1.3
1,1,2-Trichloro-1,2,2-trifluoroethane (FREON 113)	76131	210

All guidelines are current with the information listed in IRIS as of March 19, 2008, except where noted.

<sup>1</sup> The MCLs for aldicarb, aldicarb sulfone and aldicarb sulfoxide have been stayed.

<sup>2</sup> See footnote 1 above.

<sup>3</sup> See footnote 1 above.

<sup>4</sup> This guideline applies to non-chlorinated water supplies. For chlorinated drinking water supplies, please contact the Drinking Water Program.

<sup>5</sup> The health-based guideline for MTBE was reviewed by ORS in 2000.

<sup>6</sup> The MCL for Nickel has been remanded and is no longer in effect, however the current EPA IRIS chronic oral reference dose for soluble salts of nickel (<http://www.epa.gov/iris/subst/0271.htm>) supports this value and it is also the currently listed EPA Life-time Health Advisory value (<http://www.epa.gov/waterscience/criteria/drinking/standards/dwstandards.pdf>).

<sup>7</sup> Monitoring for these compounds is not required but is done on a case-by-case basis. These limits may be used when evaluating health risks posed by clearly identified mixtures of petroleum hydrocarbon compounds. The analytical methods to use to generate data to compare to the Drinking Water Guidelines are the Volatile Petroleum Hydrocarbon (VPH) and the Extractable Petroleum Hydrocarbon (EPH) methods developed by the MassDEP (MassDEP 1998).

<sup>8</sup> The overlap in the C<sub>9</sub>-C<sub>12</sub> range is the result of the VPH and EPH analytical methods used to quantitate these ranges of petroleum hydrocarbons in drinking water. The choice of the most appropriate range to use is based on the identity of the petroleum product of concern and is therefore determined on a case-specific basis.

<sup>9</sup> See footnote 9 above.

<sup>10</sup> All detections of sodium must be reported. Please refer to 310 CMR 22.06A for the specific requirements. The sodium guideline of 20 mg/L is based on an eight (8) ounce serving.

**SPRING 2009**  
**SECONDARY MAXIMUM CONTAMINANT LEVELS**

Please note that drinking water guidance is contained in five separate lists, in the following order:  
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 (3) Massachusetts Maximum Contaminant Levels – Biologicals; (4) Massachusetts Drinking Water Guidelines;  
 (5) Secondary Maximum Contaminant Levels

Chemicals/Parameter	Status	SMCL (mg/L)
Aluminum	F <sup>1</sup>	0.05 to 0.2
Chloride	F	250
Color	F	15 Color Units
Copper	F	1
Corrosivity	F	non-corrosive
Fluoride	F	2
Foaming agents	F	0.5
Iron	F	0.3
Manganese	F	0.05
Methyl <i>tertiary</i> butyl ether <sup>2</sup>	A <sup>3</sup>	0.020-0.040
Odor	F	3 threshold odor numbers
pH <sup>4</sup>	F	6.5 - 8.5
Silver	F	0.10
Sulfate	F	250 <sup>5</sup>
Total dissolved solids (TDS)	F	500
Zinc	F	5

Secondary Standards are referenced in the Massachusetts Drinking Water Regulations (310 CMR 22.07 (d)).

<sup>1</sup> Final

<sup>2</sup> The secondary MCL for MTBE is based on the Drinking Water Advisory set by EPA and is based on taste and odor considerations.

<sup>3</sup> Advisory

<sup>4</sup> This range of values is set to avoid adverse aesthetic impacts. Alternate system-specific values for pH may be generated for other program areas (e.g., Lead and Copper Rule water quality parameters; Immediate Action Level for Water Treatment Plant Chemicals).

<sup>5</sup> An MCL of 500 mg/L has been proposed by USEPA (Federal Register 12/20/94).