

**PART II
MAXIMUM CONTAMINANT LEVELS**

§ 201 PURPOSE

The purpose of this part is to define the Maximum Contaminant Levels, or MCL, for each contaminant.

§ 202 SPECIAL MAXIMUM CONTAMINANT LEVELS for ARSENIC and NITRATE

- A. The MCL for arsenic of 0.010 mg/L or 10 parts per billion (10ppb) applies to community water systems and non-transient, non-community water systems and shall become effective January 23, 2006.
 - 1. Compliance with the MCL for arsenic is calculated pursuant to § 405.
 - 2. The owner/operator shall report the most recent arsenic levels in their water systems. These levels and health effects shall be reported in the Consumer Confidence Reports required by Part XII of these regulations.
- B. The MCL for nitrate is 10mg/L or 10 parts per million (10ppm).
- C. At the discretion of the Director, nitrate levels not exceeding 20 mg/L may be allowed in a non-community water system if the public water system owner or operator demonstrates to the satisfaction of the Director that:
 - 1. Such water will not be available to children under six months of age;
 - 2. There will be continuous public notification stating that nitrate levels exceed 10 mg/L and lists the potential health effects due to exposure;
 - 3. PWSSP shall be notified annually of nitrate levels that exceed 10 mg/L; and
 - 4. No adverse health effects shall result.

§ 203 MAXIMUM CONTAMINANT LEVELS and MAXIMUM CONTAMINANT LEVEL GOALS FOR INORGANIC CONTAMINANTS

- A. Applicability
 - 1. The MCLs for inorganic contaminants (1)-(10), (12)-(13), and (17)-(18) of Table 200.1 applies to community water systems (CWS) and non-transient, non-community water systems (NTNCWS).
 - 2. The MCL specified in (11) of Table 200.1 only applies to CWSs.
 - 3. The MCLs specified in (14)-(16) of Table 200.1 apply to CWSs; NTNCWSs; and transient non-community water systems (TNCWS).
 - 4. The MCLs specified in (14), (15) and (16) of Table 200.1 apply to consecutive public water systems. Other MCL sampling requirements will be determined, by the Director, after a sanitary survey of the system, a wellhead protection delineation or a vulnerability assessment survey indicates that further sampling requirements are needed. MCL sampling for asbestos (4) is required for those systems with asbestos-cement pipe in the distribution system.
 - 5. BAT(s) are the best available technology, treatment technique, or other means available for achieving compliance with the MCLs for inorganic contaminants and are identified in Table 200.1.

TABLE 200.1 MAXIMUM CONTAMINANT LEVELS, MAXIMUM CONTAMINANT LEVEL GOALS with EFFECTIVE DATES for INORGANIC CONTAMINANTS

#	EFFECTIVE DATE	CONTAMINANT	MCL mg/L	MCLG mg/L	BATs
1	3/21/1996	Antimony	0.006	0.006	2,7
2	3/21/1996	Arsenic ⁴	0.05	Zero	1,2,5,6,7,9,12 ⁵

3	1/23/2006	Arsenic ⁴	0.010 ⁶	Zero	1,2,5,6,7,9,12 ⁵
4	3/21/1996	Asbestos	7 million fibers/liter (longer than 10µm)	7 million fibers/liter (longer than 10µm)	2,3,8
5	3/21/1996	Barium	2	2	5,6,7,9
6	3/21/1996	Beryllium	0.004	0.004	1,2,5,6,7
7	3/21/1996	Cadmium	0.005	0.005	2,5,6,7
8	3/21/1996	Chromium	0.1	0.1	2,5,6 ² , 7
9	3/21/1996	Copper		1.3	
10	3/21/1996	Cyanide (as free cyanide)	0.2	0.2	5,7,10
11	3/21/1996	Fluoride	4.0	4.0	
12	3/21/1996	Lead	0.015	Zero	
13	3/21/1996	Mercury	0.002	0.002	2 ¹ ,4,6 ¹ ,7 ¹
14	3/21/1996	Nitrate	10 (as Nitrogen)	10 (as Nitrogen)	5,7,9
15	3/21/1996	Nitrite	1 (as Nitrogen)	1 (as Nitrogen)	5,7
16	3/21/1996	Total Nitrate and Nitrite	10 (as Nitrogen)	10 (as Nitrogen)	
17	3/21/1996	Selenium	0.05	0.05	1,2 ³ ,6,7,9
18	3/21/1996	Thallium	0.002	0.0005	1,5

¹ BAT only if influent Hg concentrations ≤10 micrograms/liter.

² BAT for Chromium III only.

³ BAT for Selenium IV only.

⁴ BATs for Arsenic V. Pre-oxidation may be required to convert Arsenic III to Arsenic V.

⁵ To obtain high removals, iron to arsenic ratio must be at least 20:1.

⁶ This MCL will replace the 0.05 mg/L MCL and will apply to CWS and NTNCWS, effective January 23, 2006.

Key to BAT(s) in Table 200.1

1 = Activated Alumina	5 = Ion Exchange	9 = Electrodialysis
2 = Coagulation/Filtration	6 = Lime Softening	10= Chlorine
3 = Direct & Diatomite Filtration	7 = Reverse Osmosis	11= Ultraviolet
4 = Granular Activated Carbon	8 = Corrosion Control	12= Oxidation / Filtration
		13= Alkaline Chlorination (pH ≥8.5)

6. The Administrator, pursuant to section 1412 of the Safe Drinking Water Act (SDWA), hereby identifies in the following table the affordable technology, treatment technique or other means available to systems serving 10,000 persons or fewer for achieving compliance with the maximum contaminant level for arsenic:

TABLE 200.2 SMALL SYSTEM COMPLIANCE TECHNOLOGIES (SSCTS)¹ FOR ARSENIC²

Small system compliance technology	Affordable for listed small system categories ³
Activated Alumina (centralized)	All size categories.
Activated Alumina (Point-of-Use) ⁴	All size categories.
Coagulation/Filtration ⁵	501-3,300 and 3,301-10,000.
Coagulation-assisted Micro-filtration	501-3,300 and 3,301-10,000.
Electrodialysis reversal ⁶	501-3,300 and 3,301-10,000.
Enhanced coagulation/Filtration	All size categories.
Enhanced lime softening (pH>10.5)	All size categories.
Ion Exchange	All size categories.
Lime Softening	501-3,300 and 3,301-10,000.
Oxidation/Filtration ⁷	All size categories.
Reverse Osmosis (centralized) ⁶	501-3,300 and 3,301-10,000.
Reverse Osmosis (Point-of-Use) ⁴	All size categories.

¹Section 1412 (b) (4) (E) (ii) of the SDWA specifies that SSCTs must be affordable and technically feasible for small systems.

²SSCTs for Arsenic V. Pre-oxidation may be required to convert Arsenic III to Arsenic V.

³The Act (ibid.) Specifies three categories of small systems; (i) those serving 25 or more, but fewer than 501, (ii) those serving more than 500, but fewer than 3,301, and (iii) those serving more than 3,300 but fewer than 10,001.

⁴When POU or POE devices are used for compliance, programs to ensure proper long-term operation, maintenance, and monitoring must be provided by the water system to ensure adequate performance.

⁵Unlikely to be installed solely for arsenic removal. May require pH adjustment to optimal range if high removals are needed.

⁶Technologies reject a large volume of water, may not be appropriate for areas where water quantity may be an issue.

⁷To obtain high removals, iron to arsenic ratio must be at least 20:1.

§ 204 MAXIMUM CONTAMINANT LEVELS and MAXIMUM CONTAMINANT LEVEL GOALS FOR ORGANIC CONTAMINANTS

A. Applicability

- The following MCLs for organic contaminants apply to CWSs and NTCWSs.

TABLE 200.3 MAXIMUM CONTAMINANT LEVELS and MAXIMUM CONTAMINANT LEVEL GOALS for VOLATILE ORGANIC CHEMICALS with EFFECTIVE DATES

#	CAS ¹ No.	EFFECTIVE DATES	CONTAMINANT	MCL mg/L	MCLG mg/L
1	75-01-4	3/21/1996	Vinyl chloride	0.002	0.00
2	71-43-2	3/21/1996	Benzene	0.005	0.00
3	56-23-5	3/21/1996	Carbon tetrachloride	0.005	0.00
4	107-06-2	3/21/1996	1,2-Dichloroethane	0.005	0.00
5	79-01-6	3/21/1996	Trichloroethylene	0.005	0.00
6	106-46-7	3/21/1996	para-Dichlorobenzene	0.075	0.075
7	75-35-4	3/21/1996	1,1-Dichloroethylene	0.007	0.007

8	71-55-6	3/21/1996	1,1,1-Trichloroethane	0.2	0.20
9	156-59-2	3/21/1996	cis-1,2-Dichloroethylene	0.07	0.07
10	78-87-5	3/21/1996	1,2-Dichloropropane	0.005	0.00
11	100-41-4	3/21/1996	Ethylbenzene	0.7	0.7
12	108-90-7	3/21/1996	Monochlorobenzene	0.1	0.1
13	95-50-1	3/21/1996	o-Dichlorobenzene	0.6	0.6
14	100-42-5	3/21/1996	Styrene	0.1	0.1
15	127-18-4	3/21/1996	Tetrachloroethylene	0.005	0.00
16	108-88-3	3/21/1996	Toluene	1	1
17	156-60-5	3/21/1996	trans-1,2-Dichloroethylene	0.1	0.1
18	1330-20-7	3/21/1996	Xylenes (total)	10	10
19	75-09-2	3/21/1996	Dichloromethane	0.005	0.00
20	120-82-1	3/21/1996	1,2,4-Trichlorobenzene	0.07	0.07
21	79-00-5	3/21/1996	1,1,2-Trichloroethane	0.005	0.003

¹Chemical Abstract Service Number

2. The following MCLs and MCLGs for synthetic organic contaminants apply to CWSs and NTNCWS.

TABLE 200.4 MAXIMUM CONTAMINANT LEVELS, MAXIMUM CONTAMINANT LEVEL GOALS with EFFECTIVE DATES for SYNTHETIC ORGANIC CHEMICALS

#	CAS No.	EFFECTIVE DATES	CONTAMINANT	MCL mg/L	MCLG mg/L
1	15972-60-8	3/21/1996	Alachlor	0.002	0.00
2	116-06-3	3/21/1996	Aldicarb	0.003	0.001
3	1646-87-3	3/21/1996	Aldicarb sulfoxide	0.004	0.001
4	1646-87-4	3/21/1996	Aldicarb sulfone	0.002	0.001
5	1912-24-9	3/21/1996	Atrazine	0.003	0.003
6	1563-66-2	3/21/1996	Carbofuran	0.04	0.04
7	57-74-9	3/21/1996	Chlordane	0.002	0.00
8	96-12-8	3/21/1996	Dibromochloropropane	0.0002	0.00
9	94-75-7	3/21/1996	2,4-D	0.07	0.07
10	106-93-4	3/21/1996	Ethylene dibromide	0.00005	0.00
11	76-44-8	3/21/1996	Heptachlor	0.0004	0.00

12	1024-57-3	3/21/1996	Heptachlor epoxide	0.0002	0.00
13	58-89-9	3/21/1996	Lindane	0.0002	0.0002
14	72-43-5	3/21/1996	Methoxychlor	0.04	0.04
15	1336-36-3	3/21/1996	Polychlorinated biphenyls	0.0005	0.00
16	87-86-5	3/21/1996	Pentachlorophenol	0.001	0.00
17	8001-35-2	3/21/1996	Toxaphene	0.003	0.00
18	93-72-1	3/21/1996	2,4,5-TP	0.05	0.05
19	50-32-8	3/21/1996	Benzo[a]pyrene	0.0002	0.00
20	75-99-0	3/21/1996	Dalapon	0.2	0.2
21	103-23-1	3/21/1996	Di(2-ethylhexyl)adipate	0.4	0.4
22	117-81-7	3/21/1996	Di(2-ethylhexyl)phthalate	0.006	0.00
23	88-85-7	3/21/1996	Dinoseb	0.007	0.007
24	85-00-7	3/21/1996	Diquat	0.02	0.02
25	145-73-3	3/21/1996	Endothall	0.1	0.1
26	72-20-8	3/21/1996	Endrin	0.002	0.002
27	1071-83-6	3/21/1996	Glyphosate	0.7	0.7
28	118-74-1	3/21/1996	Hexachlorobenzene	0.001	0.00
29	77-47-4	3/21/1996	Hexachlorocyclopentadiene	0.05	0.05
30	23135-22-0	3/21/1996	Oxamyl (Vydate)	0.2	0.2
31	1918-02-1	3/21/1996	Picloram	0.5	0.5
32	122-34-9	3/21/1996	Simazine	0.004	0.004
33	1746-01-6	3/21/1996	2,3,7,8-TCDD (Dioxin)	3x10 ⁻⁸	0.00

B. The Administrator pursuant to §1412 of the SDWA has identified as indicated in Table 200.5 the granular activated carbon (GAC), packed tower aeration (PTA), or oxidation (OX) techniques as the best technology treatment technique or other means available for achieving compliance with the MCL for organic contaminants identified in subsections (A) (1) and (A) (2) of this section:

TABLE 200.5 BAT FOR ORGANIC CONTAMINANTS (SYNTHETIC AND VOLATILE)

#	CAS No.	CONTAMINANT	GAC	PTA	OX
1.	15972-60-8	Alachlor	X		

2.	116-06-3	Aldicarb	X		
3	1646-88-4	Aldicarb sulfone	X		
4	1646-87-3	Aldicarb sulfoxide	X		
5	1912-24-9	Atrazine	X		
6	71-43-2	Benzene	X	X	
7	50-32-8	Benzo[a]pyrene	X		
8	1563-66-2	Carbofuran	X		
9	56-23-5	Carbon tetrachloride	X	X	
10	57-74-9	Chlordane	X		
11	75-99-0	Dalapon	X		
12	94-75-7	2,4-D	X		
13	103-23-1	Di(2-ethylhexyl)adipate	X	X	
14	117-81-7	Di(2-ethylhexyl)phthalate	X		
15	96-12-8	Dibromochloropropane (DBCP)	X	X	
16	95-50-1	o-Dichlorobenzene	X	X	
17	106-46-7	para-Dichlorobenzene	X	X	
18	107-06-2	1,2-Dichloroethane	X	X	
19	75-35-4	1,1-Dichloroethylene	X	X	
20	156-59-2	cis-1,2-Dichloroethylene	X	X	
21	156-60-5	trans-1,2-Dichloroethylene	X	X	
22	75-09-2	Dichloromethane		X	
23	78-87-5	1,2-Dichloropropane	X	X	
24	88-85-7	Dinoseb	X		
25	85-00-7	Diquat	X		
26	145-73-3	Endothall	X		
27	72-20-8	Endrin	X		
28	100-41-4	Ethylbenzene	X	X	
29	106-93-4	Ethylene Dibromide (EDB)	X	X	

30	1071-83-6	Glyphosate			X
31	76-44-8	Heptachlor	X		
32	1024-57-3	Heptachlor epoxide	X		
33	118-74-1	Hexachlorobenzene	X		
34	77-47-3	Hexachlorocyclopentadiene	X	X	
35	58-89-9	Lindane	X		
36	72-43-5	Methoxychlor	X		
37	108-90-7	Monochlorobenzene	X	X	
38	23135-22-0	Oxamyl (Vydate)	X		
39	87-86-5	Pentachlorophenol	X		
40	1918-02-1	Picloram	X		
41	1336-36-3	Polychlorinated biphenyls	X		
42	122-34-9	Simazine	X		
43	100-42-5	Styrene	X	X	
44	1746-01-6	2,3,7,8-TCDD (Dioxin)	X		
45	127-18-4	Tetrachloroethylene	X	X	
46	108-88-3	Toluene	X	X	
47	8001-35-2	Toxaphene	X		
48	93-72-1	2,4,5-TP (Silvex)	X		
49	120-82-1	1,2,4-Trichlorobenzene	X	X	
50	71-55-6	1,1,1-Trichloroethane	X	X	
51	79-00-5	1,1,2-Trichloroethane	X	X	
52	79-01-6	Trichloroethylene	X	X	
53	75-01-4	Vinyl chloride		X	
54	1330-20-7	Xylene	X	X	

§ 205 MAXIMUM CONTAMINANT LEVELS and MAXIMUM CONTAMINANT LEVEL GOALS FOR MICROBIOLOGICAL CONTAMINANTS

A. A public water system must determine compliance with the MCL for total coliforms in subsections (B) and (C) of this section for each month in which it is required to monitor for total coliforms.

B. Applicability

- Each CWS, NTNCWS, TNCWS and Consecutive system is required to comply with this section. The MCL for total coliform is based on the presence or absence in a sample, rather than coliform density.

TABLE 200.6 MAXIMUM CONTAMINANT LEVELS and MAXIMUM CONTAMINANT LEVEL GOALS FOR MICROBIOLOGICAL CONTAMINANTS

#	CONTAMINANT	MCL	MCLG
1	<i>Giardia lamblia</i>	zero	zero
2	Viruses	zero	zero
3	<i>Legionella</i>	zero	zero
4	Total coliforms	zero	zero
5	Cryptosporidium	zero	zero

C. Compliance

- For a system that collects 40 or more samples per month, the system is in compliance with the MCL for total coliforms if no more than 5.0% of the samples collected during the month are total coliform-positive.
- For a system that collects less than 40 samples per month, the system is in compliance with the MCL for total coliforms if no more than one sample collected during the month is total coliform-positive.
- Any fecal coliform-positive repeat sample or *E.coli*-positive repeat sample, or any total coliform-positive repeat sample following a fecal coliform-positive or *E.coli*-positive routine sample constitutes a violation of the MCL for total coliforms. For purposes of the public notification requirements in Part VI, this is a violation that may pose an acute risk to health.

D. The following are identified as the best available technology, treatment techniques, or other means to achieve compliance with the MCL for total coliforms in subsections (B) and (C) of this section:

- Protection of wells from total coliform contamination by appropriate construction and location;
- Maintain a disinfectant residual throughout the distribution system;
- Proper maintenance of the distribution system including appropriate pipe replacement and repair procedures, adequate flushing programs, proper operation and maintenance of storage tanks and reservoirs, and continual maintenance of positive water pressure in all parts of the distribution system;
- Filtration and/or disinfection of surface water, as described in Parts VIII and XIII (General Requirements for Surface Water Treatment and Enhanced Surface Water Treatment), or disinfection of groundwater using strong oxidants such as chlorine, chlorine dioxide, or ozone;
- Compliance with the requirements of an NNEPA-approved Wellhead Protection Program that is developed and implemented pursuant to § 308 of the NNSDWA and Part XVII of these regulations-Wellhead Protection Regulations; and
- Proper placement, maintenance and testing of backflow prevention and cross connection devices, as described in Part XX of these regulations.

§ 206 MAXIMUM CONTAMINANT LEVELS FOR TURBIDITY

The MCL for turbidity are applicable to both community and non-community water systems using surface water sources in whole or in part. The MCL for turbidity in drinking water, measured at a representative entry point(s) to the distribution system are:

- One turbidity unit (TU), as determined by a monthly average pursuant to § 414, except that five

or fewer turbidity units may be allowed if the public water system owner or operator can demonstrate to the Director that the higher turbidity level does not:

1. Interfere with disinfection;
2. Prevent maintenance of an effective disinfectant agent throughout the distribution system; or
3. Interfere with microbiological determinations.

B. Five turbidity units based on an average for two consecutive days pursuant to § 414.

§ 207 MAXIMUM CONTAMINANT LEVELS and MAXIMUM CONTAMINANT LEVEL GOALS for DISINFECTION BYPRODUCTS

A. Applicability

1. The MCLs and MCLGs for Disinfection Byproducts are as follows:

TABLE 200.7 MCLs FOR DISINFECTION BYPRODUCTS

Disinfection Byproduct	MCL (mg/L)	MCLG (mg/L)
Total Trihalomethanes (TTHM)	0.080	
Haloacetic acids (five) (HAA5)	0.060	
Bromate	0.010	Zero
Chlorite	1.0	0.8
Bromodichloromethane		Zero
Bromoform		Zero
Chloroform		0.07
Dichloroacetic Acid		Zero
Trichloroacetic Acid		0.02
Dibromochloromethane		0.06
Monochloroacetic Acid		0.07

B. Compliance Dates

1. All CWSs and NTNCWSs:
 - a. Part VIII - General Requirements for Surface Water Systems serving 10,000 or more persons must comply with this section upon promulgation of these regulations;
 - b. Part VIII - General Requirements for Surface Water Systems serving fewer than 10,000 persons must comply with this section beginning January 1, 2004;
 - c. Public water systems using only ground water not under the direct influence of surface water must comply with this section beginning January 1, 2004.
 - d. All systems must comply with the MCLs listed in this section until the date specified for Part XXIII compliance in §2300(C).
 - i. Part XXIII MCLs for TTHM and HAA5 must be complied with as a locational running annual average at each monitoring location beginning with the date specified for Part XXIII compliance in §2301(C).
2. A system that is installing GAC or membrane technology to comply with this section may apply to the Director for an extension of up to 24 months past the date of promulgation of these regulations, but not beyond December 31, 2003. In granting the extension, the Director must set a schedule for compliance and may specify any interim measures that the system must take. Failure to meet the schedule or interim treatment requirements constitutes a violation of the NNPDWR.

C. The Administrator, pursuant to § 1412 of the SDWA, has identified the following as the best available technology, treatment techniques, or other means available to achieve compliance with the MCLs for disinfection byproducts identified in subsection (A) of this section:

TABLE 200.8 BATs FOR DISINFECTION BYPRODUCTS

Disinfection Byproduct	Best Available Technology

TTHM	Enhanced coagulation or enhanced softening or GAC10, with chlorine as the primary and residual disinfectant.
HAA5	Enhanced coagulation or enhanced softening or GAC10, with chlorine as the primary and residual disinfectant.
Bromate	Control of ozone treatment processes to reduce production of bromate.
Chlorite	Control of treatment processes to reduce disinfectant demand and control of disinfection treatment processes to reduce disinfectant levels.

D. The Administrator, pursuant to section 1412 of the SDWA, hereby identifies the following as the best technology, treatment techniques, or other means available for achieving compliance with the maximum contaminant levels for TTHM and HAA5 identified in this subsection (D) for all systems that disinfect their source water:

Disinfection byproduct	Best available technology
Total trihalomethanes (TTHM) and Haloacetic acids (five) (HAA5).	Enhanced coagulation or enhanced softening, plus GAC10; or nanofiltration with a molecular weight cutoff ≤ 1000 Daltons; or GAC20.

E. The Administrator, pursuant to section 1412 of the SDWA, hereby identifies the following as the best technology, treatment techniques, or other means available for achieving compliance with the maximum contaminant levels for TTHM and HAA5 identified in this subsection (E) for consecutive systems that buy or otherwise receive finished water:

Disinfection byproduct	Best available technology
Total trihalomethanes (TTHM) and Haloacetic acids (five) (HAA5).	Systems serving $\geq 10,000$: Improved distribution system and storage tank management to reduce residence time, plus the use of chloramines for disinfectant residual maintenance Systems serving $\leq 10,000$: Improved distribution system and storage tank management to reduce residence time

§ 208 MAXIMUM RESIDUAL DISINFECTANT LEVELS and MAXIMUM RESIDUAL DISINFECTANT LEVEL GOALS

A. Applicability

1. The Maximum Residual Disinfectant Levels and Maximum Residual Disinfectant Level Goals are as follows:

TABLE 200.9 MAXIMUM RESIDUAL DISINFECTANT LEVELS (MRDLs) and MAXIMUM RESIDUAL DISINFECTANT LEVEL GOALS (MRDLGs)

Disinfectant residual	MRDL (mg/L)	MRDLG (mg/L)
Chlorine	4.0 (as Cl ₂)	4.0 (as Cl ₂)
Chloramines	4.0 (as Cl ₂)	4.0 (as Cl ₂)
Chlorine dioxide	0.8 (as ClO ₂)	0.8 (as ClO ₂)

B. Compliance Dates

1. All CWSs and NTNCWSs:

- a. Part VIII - General Requirements for Surface Water Systems serving 10,000 or more persons must comply with this section upon promulgation of these regulations;
- b. Part VIII - General Requirements for Surface Water Systems serving fewer than 10,000 persons must comply with this section beginning January 1, 2004;
- c. Public water systems using only ground water, not under the direct influence of surface water, must comply with this section beginning January 1, 2004.

2. All TNCWSs:

- a. Part VIII - General Requirements for Surface Water Systems serving 10,000 or more persons and using chlorine dioxide as a disinfectant or oxidant must comply with

the chlorine dioxide MRDL upon promulgation of these regulations;

- b. Part VIII - General Requirements for Surface Water Systems serving fewer than 10,000 persons and using chlorine dioxide as a disinfectant or oxidant must comply with the chlorine dioxide MRDL beginning January 1, 2004;
- c. Public water systems using only ground water, not under the direct influence of surface water, and using chlorine dioxide as a disinfectant or oxidant must comply with the chlorine dioxide MRDL beginning January 1, 2004.

C. The Administrator, pursuant to §1412 of the SDWA, has identified the following as the best available technology, treatment techniques, or other means available to achieve compliance with the maximum residual disinfectant levels identified in subsection (A) of this section: control of treatment processes to reduce disinfectant demand and control of disinfection treatment processes to reduce disinfectant levels.

§ 209 MAXIMUM CONTAMINANT LEVELS AND MAXIMUM CONTAMINANT LEVEL GOALS FOR RADIONUCLIDES

A. Applicability

- 1. The following MCLs and MCLGs for radionuclides apply to CWSs.

Table 200.10 MAXIMUM CONTAMINANT LEVELS and MAXIMUM CONTAMINANT LEVEL GOALS FOR RADIONUCLIDES

#	Contaminant	MCL	MCLG
1	Gross alpha particle activity	15 pCi/L (including radium-226 but excluding radon and uranium)	Zero
2	Combined radium-226 and radium-228	5 pCi/L (see note 1 below)	Zero
3	Beta particle and photon radioactivity	4 millirem/year (see notes 2 and 3 below)	Zero
4	Uranium	30 micrograms per liter (µg/L)	Zero

Notes:

- 1. The combined radium-226 and radium-228 value is determined by adding the results of the analysis for radium-226 and the analysis for radium-228.
- 2. The average annual concentration of beta particle and photon radioactivity from man-made radionuclides in drinking water must not produce an annual dose equivalent to the total body or any internal organ greater than 4 millirem/year (mrem/year).
- 3. Except for the radionuclides listed in Table 200.11, the concentration of man-made radionuclides causing 4 mrem total body or organ dose equivalents must be calculated on the basis of 2 liters per day drinking water intake using the 168 hour data list in "Maximum Permissible Body Burdens and Maximum Permissible Concentrations of Radionuclides in Air and in Water for Occupational Exposure, NBS (National Bureau of Standards) Handbook 69 as amended August 1963, U.S. Department of Commerce¹. If two or more radionuclides are present, the sum of their annual dose equivalent to the total body or to any organ shall not exceed 4 mrem/year.

¹ This incorporation by reference was approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. Copies of this document are available from the National Technical Information Service, NTIS ADA 280 282, U.S. Department of Commerce, 5285 Port Royal Road, Springfield, Virginia 22161. The toll-free number is 800-553-6847. Copies may be inspected at EPA's Drinking Water Docket, 401 M Street, SW., Washington, DC 20460; or at the Office of the Federal Register, 800 North Capitol Street, NW., Suite 700, Washington, DC.

TABLE 200.11 AVERAGE ANNUAL CONCENTRATIONS ASSUMED TO PRODUCE A TOTAL BODY OR ORGAN DOSE OF 4 mrem/yr

#	Radionuclide	Critical organ	pCi per liter
1	Tritium	Total body	20,000
2	Strontium-90	Bone marrow	8

B. Compliance dates for combined radium-226 and radium-228, gross alpha particle activity, gross beta particle, photon radioactivity, and uranium:

- 1. CWSs must comply with the MCLs listed in Table 200.10 beginning December 8, 2003 and

compliance shall be determined in accordance with the requirements of § 411. Compliance with the reporting requirements for radionuclides is listed in Part XII (Consumer Confidence Report) Appendix F and Part VII (Public Notification) Appendices B and is required beginning December 8, 2003.

C. BATs for radionuclides

- The Administrator pursuant to § 1412 of the SDWA has identified as indicated in the following table, the best available technology to achieve compliance with the MCLs for combined radium-226 and radium-228, uranium, gross alpha particle activity, beta particle and photon radioactivity.

TABLE 200.12 BATs FOR COMBINED RADIUM-226 AND RADIUM-228, URANIUM, GROSS ALPHA PARTICLE ACTIVITY, BETA PARTICLE AND PHOTON RADIOACTIVITY

#	Contaminant	BATs
1	Combined radium-226 and radium-228	Ion exchange, reverse osmosis, lime softening
2	Uranium	Ion exchange, reverse osmosis, lime softening, coagulation/filtration
3	Gross alpha particle activity (excluding radon and uranium)	Reverse osmosis
4	Beta particle and photon radioactivity	Ion exchange, reverse osmosis

D. Compliance technologies for radionuclides for small water systems

TABLE 200.13 COMPLIANCE TECHNOLOGIES FOR RADIONUCLIDES FOR SMALL WATER SYSTEMS AND LIMITATIONS OF USE

#	Unit Technologies	Limitations (see footnotes)	Operator skill level ¹	Raw water quality range and considerations ¹
1.	Ion exchange (IE)	a	Intermediate	All ground waters
2.	Point of use (POU ²)	b	Basic	All ground waters
3.	Reverse osmosis (RO)	c	Advanced	Surface waters usually require pre-filtration
4.	POU ² RO	b	Basic	Surface waters usually require pre-filtration
5.	Lime softening	d	Advanced	All waters
6.	Green sand filtration	e	Basic	
7.	Co-precipitation with barium sulfate	f	Intermediate to Advanced	Ground waters with suitable water quality
8.	Electrodialysis/ electrodialysis reversal		Basic to Intermediate	All ground waters
9.	Pre-formed hydrous manganese oxide filtration	g	Intermediate	All ground waters
10.	Activated alumina	a, h	Advanced	All ground waters; competing anion concentrations may affect regeneration frequency
11.	Enhanced coagulation/ filtration	i	Advanced	Can treat a wide range of water qualities

¹ National Research Council (NRC). Safe Water from Every Tap: Improving Water Service to Small Communities. National Academy Press. Washington, D.C. 1997. Basic means Level 1, Intermediate means

Level 2 or 3 and Advanced means Level 4 as defined in §1400.

² A POU, or "point-of-use" technology is a treatment device installed at a single tap used for the purpose of reducing contaminants in drinking water at that one tap. POU devices are typically installed at the kitchen tap. See the April 21, 2000 NODA for more details.

Limitations Footnotes: Technologies for Radionuclides:

- a The regeneration solution contains high concentrations of the contaminant ions. Disposal options should be carefully considered before choosing this technology.
- b When POU devices are used for compliance, programs for long-term operation, maintenance, and monitoring must be provided by water utility to ensure proper performance.
- c Reject water disposal options should be carefully considered before choosing this technology. See other RO limitations described in the SWTR Compliance Technologies Table.
- d The combination of variable source water quality and the complexity of the water chemistry involved may make this technology too complex for small surface water systems.
- e Removal efficiencies can vary depending on water quality.
- f This technology may be very limited in application to small systems. Since the process requires static mixing, detention basins, and filtration, it is most applicable to systems with sufficiently high sulfate levels that already have a suitable filtration treatment train in place.
- g This technology is most applicable to small systems that already have filtration in place.
- h Handling of chemicals required during regeneration and pH adjustment may be too difficult for small systems without an adequately trained operator.
- i Assumes modification to a coagulation/filtration process already in place.

Table 200.14 COMPLIANCE TECHNOLOGIES BY SYSTEM SIZE CATEGORY FOR RADIONUCLIDES

#	Contaminant	Compliance Technologies ¹ for systems size categories (population served)		
		25-500	501-3,300	3,300-10,000
1	Combined radium-226 and radium-228	1, 2, 3, 4, 5, 6, 7, 8, 9	1, 2, 3, 4, 5, 6, 7, 8, 9	1, 2, 3, 4, 5, 6, 7, 8, 9
2	Gross alpha particle activity	3, 4	3, 4	3, 4
3	Beta particle activity and photon activity	1, 2, 3, 4	1, 2, 3, 4	1, 2, 3, 4
4	Uranium	1, 2, 4, 10, 11	1, 2, 3, 4, 5, 10, 11	1, 2, 3, 4, 5, 10, 11

NOTE: ¹Numbers correspond to those technologies found listed in the Table 200.13 of this section.

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