

Appendix C. Reference Standards and Data for Water

Table C.1. Reference standards for radionuclides in water

Parameter ^a	National primary drinking water standard ^b	4% of DCG ^c	DCG ^d
²⁴¹ Am		1.2	30
²¹⁴ Bi		24,000	600,000
¹⁰⁹ Cd		400	10,000
¹⁴³ Ce		1,200	30,000
⁶⁰ Co		200	5,000
⁵¹ Cr		40,000	1,000,000
¹³⁷ Cs		120	3,000
¹⁵⁵ Eu		4,000	100,000
Gross alpha ^e	15		
Gross beta (mrem/year)	4 ^f		
³ H	20,000 ^g	80,000	2,000,000
¹³¹ I		120	3,000
⁴⁰ K		280	7,000
²³⁷ Np		1.2	30
^{234m} Pa		2,800	70,000
²³⁸ Pu		1.6	40
^{239/240} Pu		1.2	30
²²⁶ Ra	5 ^h	4	100
²²⁸ Ra	5 ^h	4	100
¹⁰⁶ Ru		240	6,000
⁹⁰ Sr	8 ^g	40	1,000
⁹⁹ Tc		4,000	100,000
²²⁸ Th		16	400
²³⁰ Th		12	300
²³² Th		2	50
²³⁴ Th		400	10,000
Thorium, natural		2	50
²³⁴ U		20	500
²³⁵ U		24	600
²³⁶ U		20	500
²³⁸ U		24	600
Uranium, natural		24	600
Uranium, total ⁱ (µg/L ^j)	30	20	500

^aOnly the radionuclides included in the Oak Ridge Reservation monitoring programs are listed. Unless labeled otherwise, units are pCi/L.

^b40 CFR Part 141 National Primary Drinking Water Regulations Subparts B and G.

^cFour percent of the derived concentration guide represents the DOE criterion of 4 mrem effective dose equivalent from ingestion of drinking water.

^dU.S. DOE Order 5400.5 Chapter III, "Derived Concentration Guides for Air and Water."

^eExcludes radon and uranium.

^fPer the discussion in 40 CFR 141.26(b), compliance with the 4-mrem/year standard can be assumed if the average annual gross-beta particle activity is less than 50 pCi/L and if the average annual concentrations of ³H and ⁹⁰Sr are less than 20,000 pCi/L and 8 pCi/L, respectively, provided that, if both radionuclides are present, the sum of their annual dose equivalents to bone marrow is less than 4 mrem/year. In the text of this document, 50 pCi/L is referred to as the "screening level."

^gThese values are not maximum contaminant levels (MCLs), but are concentrations that result in the effective dose equivalent of the MCL for gross beta emissions, which is 4 mrem/year.

^hApplies to combined ²²⁶Ra and ²²⁸Ra.

ⁱMinimum of uranium isotopes.

^jEffective December 8, 2003.

Table C.2. Reference standards for chemicals and metals in water

Parameter	National drinking water standards		Tennessee water quality criteria ^c			
	Primary ^a	Secondary ^b	Domestic water supply	Fish and aquatic life CMC	Recreation	
					Organisms	Water and organisms ^d
Anions (mg/L)						
Chloride		250				
Fluoride	4	2				
Nitrate	10					
Nitrite	1					
Sulfate, as SO ₄		250				
Base/neutral/acid extractable organics (µg/L)						
1,2-Dichlorobenzene (<i>ortho</i>)	600		600		17,000	2,700
1,2-Diphenylhydrazine					2.0	0.36
1,2,4-Trichlorobenzene	70		70		940	260
1,3-Dichlorobenzene (<i>meta</i>)					960	320
1,4-Dichlorobenzene (<i>para</i>)	75		75		2,600	400
2,4-Dichlorophenol					290	77
2,4-Dimethylphenol					850	380
2,4-Dinitrophenol					5,300	69
2,4-Dinitrotoluene					34	1.1
2,4,6-Trichlorophenol					24	14
2-Chlorophenol					150	81
2-Chloronaphthalene					1,600	1,000
2-Methyl-4,6-Dinitrophenol					280	13.0
3,3-Dichlorobenzidine					0.28	0.21
3,4-Benzo(b)fluoranthene					0.18	0.038
Benzo(k)fluoranthene					0.18	0.038
Acenaphthene					990	670
Anthracene					40,000	8,300
Benzidine					0.0020	0.00086
Benzo(a)anthracene					0.18	0.038
Benzo(a)pyrene	0.2		0.2		0.18	0.038
bis-(2-chloroethyl)ether					5.3	0.30
bis-(2-Chloro-isopropyl)ether					65,000	1,400
bis-(2-ethylhexyl)phthalate	6		6		22	12
Butylbenzyl phthalate					1,900	1,500
Chrysene					0.18	0.038
Di-n-butyl phthalate					4,500	2,000
Dibenz(a,h)anthracene					0.18	0.038
Diethyl phthalate					44,000	17,000
Dimethyl phthalate					1,100,000	270,000
Fluoranthene					140	130
Fluorene					5,300	1,100
Hexachlorobenzene	1		1		0.0029	0.0028
Hexachlorobutadiene					180	4.4
Hexachlorocyclopentadiene	50		50		17,000	240
Hexachloroethane					33	14
Ideno(1,2,3-cd)pyrene					0.18	0.038
Isophorone					9,600	350

Table C.2 (continued)

Parameter	National drinking water standards		Tennessee water quality criteria ^c			
	Primary ^a	Secondary ^b	Domestic water supply	Fish and aquatic life CMC	Recreation	
					Organisms	Water and organisms ^d
N-Nitrosodimethylamine					30	0.0069
N-Nitrosodi-n-propylamine					5.1	0.05
N-Nitrosodiphenylamine					60	33
Nitrobenzene					690	17
Pentachlorophenol (pH 7.8)	1		1	19	30	2.7
Phenol					1,700,000	21,000
Pyrene					4,000	830
Field measurements						
Chlorine, (TRC), µg/L				19		
Dissolved oxygen, mg/L				5	(min)	
Temperature, µC			30.5	30.5	30.5	30.5
Turbidity, JTU ^e	1					
pH, standard units		(6.5, 8.5)	(6.0, 9.0)	(6.0, 9.0)	(6.0, 9.0)	(6.0, 9.0)
Metals (mg/L)						
Aluminum		0.05-0.2				
Antimony	0.006		0.006		4.30	0.014
Arsenic	0.01 ^f		0.010	0.340 (III)	0.010	0.010
Barium	2		2			
Beryllium	0.004		0.004			
Cadmium	0.005		0.005	0.002 ^g		
Chromium, total	0.1		0.1			
Chromium (hexavalent)				0.016		
Copper	1.3 ^h	1		0.013 ^g		
Iron		0.3				
Lead	0.015 ^h		0.005	0.065 ^g		
Manganese		0.05				
Mercury	0.002		0.002	0.0014	0.000051	0.00005
Nickel			0.1	0.470 ^g	4.6	0.61
Selenium	0.05		0.050	0.02		
Silver		0.1		0.0032 ^g		
Thallium	0.002		0.002		0.0063	0.0017
Zinc		5		0.120 ^g		
Others						
Asbestos (fibers/L)	7,000,000					
Chlorine (TRC)				0.019		
Color (color units)		15				
Cyanide (mg/L)	0.2		0.2	0.022	220	0.7
<i>E. coli</i> (no./100 mL, geometric mean)			630	630	126	126
<i>E. coli</i> (no./100 mL, individual sample)				2,880	941	941
Odor (threshold odor number)		3				
Total dissolved solids (mg/L)		500	500			

Table C.2 (continued)

Parameter	National drinking water standards		Tennessee water quality criteria ^c			
	Primary ^a	Secondary ^b	Domestic water supply	Fish and aquatic life CMC	Recreation	
					Organisms	Water and organisms ^d
Pesticides/herbicides/PCBs (µg/L)						
2,3,7,8-TCDD (Dioxin)	0.00003		0.00003		0.000001	0.000001
2,4-D	70		70			
2,4,5-TP (Silvex)	50		50			
4,4'-DDT				1.1	0.0022	0.0022
4,4'-DDE					0.0022	0.0022
4,4'-DDD					0.0031	0.0031
a-BHC					0.049	0.026
b-BHC					0.17	0.091
Alachlor	2		2			
Aldicarb	3					
Aldicarb sulfoxide	4					
Aldicarb sulfone	2					
Aldrin				3.0	0.00050	0.00049
Atrazine	3		3			
Carbofuran	40		40			
Chlordane	2		2	2.4	0.0081	0.0080
Dalapon	200		200			
1,2-Dibromo-3-chloropropane	0.2		0.2			
Di(ethylhexyl)adipate	400		400			
Dieldrin				0.24	0.00054	0.00052
Di(ethylhexyl)phthalate ⁱ						
Dinoseb	7		7			
Diquat	20		20			
a-Endosulfan				0.22	89	62
b-Endosulfan				0.22	89	62
Endosulfan sulfate					89	62
Endothall	100		100			
Endrin	2		2	0.086	0.81	0.76
Endrin aldehyde					0.30	0.29
Ethylene dibromide	0.05		0.05			
Glyphosate	700		700			
Heptachlor	0.4		0.4	0.52	0.00079	0.00079
Heptachlor epoxide	0.2		0.2	0.52	0.00039	0.00039
g-BHC (Lindane)	0.2		0.2	2.0	0.63	0.19
Methoxychlor	40		40			
Oxamyl (Vydate)	200		200			
PCB Aroclors (EPA 119-125)					0.00064	0.00064
PCB, total	0.5		0.5		0.00064	0.00064
Picloram	500		500			
Simazine	4		4			
Toxaphene	3		3	0.73	0.0028	0.0028
1,1,1-Trichloroethane	200		200			
1,1-Dichloroethene	7		7		32	0.57
1,1,2-Trichloroethane	5		5		160	5.9

Table C.2 (continued)

Parameter	National drinking water standards		Tennessee water quality criteria ^c		
	Primary ^a	Secondary ^b	Domestic water supply	Fish and aquatic life CMC	Recreation Organisms Water and organisms ^d
Volatile organics (µg/L)					
1,1,2,2-Tetrachloroethane					40 1.7
1,2-Dichloroethane	5		5		370 3.8
1,2-Dichloroethene ^j					
<i>cis</i> -1,2-Dichloroethene	70		70		
<i>trans</i> -1,2-Dichloroethene	100		100		140,000 700
1,2-Dichloropropane	5		5		150 5.0
<i>cis</i> -1,3-Dichloropropene					1,700 10
<i>trans</i> -1,3-Dichloropropene					1,700 10
Acrolein					290 190
Acrylonitrile					2.5 0.51
Benzene	5		5		510 22
Bromodichloromethane	80 ^k				170 5.5
Bromoform	80 ^k				1,400 43
Carbon tetrachloride	5		5		16 2.3
Chlorobenzene	100		100		21,000 680
Chloroform	100 ^k				4,700 57
Dibromochloromethane	100 ^k				130 4.0
Ethylbenzene	700		700		29,000 3,100
Methylbromide					1,500 47
Methylene chloride (Dichloromethane)	5		5		5,900 46
Styrene	100		100		
Tetrachloroethene	5		5		33 6.9
Toluene	1,000		1,000		200,000 6,800
Trichloroethene	5		5		300 25
Trihalomethanes, total	80 ^k				
Vinyl chloride	2		2		5,300 20
Xylene, total	10,000		10,000		

^a40 CFR Part 141—National Primary Drinking Water Regulations, Subparts B and G, as amended.

^b40 CFR Part 143—National Secondary Drinking Water Regulations, as amended.

^cRules of Tennessee Department of Environment and Conservation, Division of Water Pollution Control, Chapter 1200-4-3, General Water Quality Criteria, as amended. CMC = criterion maximum concentration.

^dThese criteria, for the protection of public health, pertain to the consumption of water and organisms. They apply only to waters designated for *both* recreation and domestic water supply.

^eJackson turbidity unit (JTU) and nephelometric turbidity unit (NTU) are roughly equivalent in the range of 25 to 1000 JTU.

^fAs of January 23, 2006.

^gThe standard is a function of total hardness. The values in this table correspond to a total-hardness value of 100 mg/L.

^h“Action level” for initiation of corrosion-control studies and treatment techniques, applicable to community water systems and nontransient, noncommunity water systems.

ⁱSee bis(2-ethylhexyl)phthalate.

^jSee *cis*-1,2-Dichloroethene and *trans*-1,2-Dichloroethene.

^kLimit for total trihalomethanes (bromodichloromethane + bromoform + chloroform + dibromochloromethane).

