

**APPENDIX B**  
**Virginia Water Quality Standards**

**Commonwealth of Virginia Department of Environmental Quality**

**Water Quality Standards  
For toxic analytes**

Adapted from

**STATE WATER CONTROL BOARD**

**9 VAC 25-260 Virginia Water Quality Standards.**

**Statutory Authority: § 62.1-44.15 3a of the Code of Virginia.**

**WITH AMENDMENTS EFFECTIVE AUGUST 10, 2005**

Refer to 9 VAC 25-260 for detailed comments on the standards summarized herein!

---

---

**9 VAC 25-260-140. Criteria for surface water.**

A. Instream water quality conditions shall not be acutely<sup>2</sup> or chronically<sup>3</sup> toxic except as allowed in 9 VAC 25-260-20 B mixing zones. The following are definitions of acute and chronic toxicity conditions:

"Acute toxicity" means an adverse effect that usually occurs shortly after exposure to a pollutant. Lethality to an organism is the usual measure of acute toxicity. Where death is not easily detected, immobilization is considered equivalent to death.

"Chronic toxicity" means an adverse effect that is irreversible or progressive or occurs because the rate of injury is greater than the rate of repair during prolonged exposure to a pollutant. This includes low level, long-term effects such as reduction in growth or reproduction.

B. The following table is a list of numerical water quality criteria for specific parameters.

When information has become available from the Environmental Protection Agency to calculate additional aquatic life or human health criteria not contained in the table, the board may employ these values in establishing effluent limitations or other limitations pursuant to 9 VAC 25-260-20 A necessary to protect designated uses until the board has completed the regulatory standards adoption process.

Table of Parameters<sup>6</sup>

PARAMETER CAS Number	USE DESIGNATION					
	AQUATIC LIFE				HUMAN HEALTH	
	FRESHWATER		SALTWATER		Public Water Supply <sup>3</sup>	All Other Surface Waters <sup>4</sup>
	Acute <sup>1</sup>	Chronic <sup>2</sup>	Acute <sup>1</sup>	Chronic <sup>2</sup>		
<b>Acenaphthene</b> (µg/l) 83329					1,200	2,700
<b>Acrolein</b> (µg/l) 107028					320	780
<b>Acrylonitrile</b> (µg/l) 107131 Known or suspected carcinogen; human health criteria at risk level 10 <sup>-5</sup> .					0.59	6.6
<b>Aldrin</b> (µg/l) 309002 Known or suspected carcinogen; human health criteria at risk level 10 <sup>-5</sup> .	3.0		1.3		0.0013	0.0014
<b>Ammonia</b> (µg/l) 766-41-7 Chronic criterion is a 30-day average concentration not to be exceeded more than once every three 3 years on the average. (see 9 VAC 25-260-155)						
<b>Anthracene</b> (µg/l) 120127					9,600	110,000
<b>Antimony</b> (µg/l) 7440360					14	4,300
<b>Arsenic</b> (µg/l) <sup>5</sup> 7440382	340	150	69	36	10	
<b>Bacteria</b> (see 9 VAC 25-260-160 and 170)						
<b>Barium</b> (µg/l) 7440393					2,000	
<b>Benzene</b> µg/l 71432 Known or suspected carcinogen; human health criteria at risk level 10 <sup>-5</sup>					12	710
<b>Benzidine</b> (µg/l) 92875 Known or suspected carcinogen; human health criteria at risk level 10 <sup>-5</sup>					0.0012	0.0054
<b>Benzo (a) anthracene</b> (µg/l) 56553 Known or suspected carcinogen; human health criteria at risk level 10 <sup>-5</sup>					0.044	0.49

PARAMETER CAS Number	USE DESIGNATION					
	AQUATIC LIFE				HUMAN HEALTH	
	FRESHWATER		SALTWATER		Public Water Supply <sup>3</sup>	All Other Surface Waters <sup>4</sup>
	Acute <sup>1</sup>	Chronic <sup>2</sup>	Acute <sup>1</sup>	Chronic <sup>2</sup>		
<b>Benzo (b) fluoranthene (µg/l)</b> 205992 Known or suspected carcinogen; human health criteria at risk level 10 <sup>-5</sup>					0.044	0.49
<b>Benzo (k) fluoranthene (µg/l)</b> 207089 Known or suspected carcinogen; human health criteria at risk level 10 <sup>-5</sup>					0.044	0.49
<b>Benzo (a) pyrene (µg/l)</b> 50328 Known or suspected carcinogen; human health criteria at risk level 10 <sup>-5</sup>					0.044	0.49
<b>Bis2-Chloroethyl Ether</b> 111444 Known or suspected carcinogen; human health criteria at risk level 10 <sup>-5</sup>					0.31	14
<b>Bis2-Chloroisopropyl Ether (µg/l)</b> 39638329					1,400	170,000
<b>Bromoform (µg/l)</b> 75252 Known or suspected carcinogen; human health criteria at risk level 10 <sup>-5</sup>					44	3,600
<b>Butyl benzyl phthalate (µg/l)</b> 85687					3,000	5,200

PARAMETER CAS Number	USE DESIGNATION					
	AQUATIC LIFE				HUMAN HEALTH	
	FRESHWATER		SALTWATER		Public Water Supply <sup>3</sup>	All Other Surface Waters <sup>4</sup>
	Acute <sup>1</sup>	Chronic <sup>2</sup>	Acute <sup>1</sup>	Chronic <sup>2</sup>		
<b>Cadmium (µg/l)<sup>5</sup></b> 7440439 Freshwater values are a function of total hardness as calcium carbonate CaCO <sub>3</sub> mg/l and the WER. The minimum hardness allowed for use in the equation below shall be 25 and the maximum hardness shall be 400 even when the actual ambient hardness is less than 25 or greater than 400. <b>Freshwater acute criterion (µg/l)</b> $WER = e^{\{1.128[\ln(\text{hardness})] - 3.828\}}$ <b>Freshwater chronic criterion (µg/l)</b> $WER = e^{\{0.7852[\ln(\text{hardness})] - 3.490\}}$ WER = Water Effect Ratio = 1 unless shown otherwise under 9 VAC 25-260-140.F and listed in 9 VAC 25-260-310 e = natural antilogarithm ln = natural logarithm	3.9 WER = 1 CaCO <sub>3</sub> = 10	1.1 WER = 1 CaCO <sub>3</sub> = 100	40 WER = 1	8.8 WER = 1	5	
<b>Carbon tetrachloride (µg/l)</b> 56235 Known or suspected carcinogen; human health criteria at risk level 10 <sup>-5</sup> .					2.5	44
<b>Chlordane (µg/l)</b> 57749 Known or suspected carcinogen; human health criteria at risk level 10 <sup>-5</sup> .	2.4	0.0043	0.09	0.0040	0.021	0.022
<b>Chloride (µg/l)</b> 16887006 Human Health criterion to maintain acceptable taste and aesthetic quality and applies at the drinking water intake.	860,000	230,000			250,000	
<b>Chlorine, Total Residual (µg/l)</b> 7782505 In DGIF class i and ii trout waters (9 VAC 25-260 subsections 390-540) or waters with threatened or endangered species are subject to the halogen ban (subsection 110.)	19 See 9 VAC 25-260-110	11 See 9 VAC 25-260-110				
<b>Chlorine Produced Oxidant (µg/l)</b> 7782505			13	7.5		
<b>Chlorobenzene (µg/l)</b> 108907					680	21,000
<b>Chlorodibromomethane (µg/l)</b> 124481 Known or suspected carcinogen; human health criteria at risk level 10 <sup>-5</sup> .					4.1	340

PARAMETER CAS Number	USE DESIGNATION					
	AQUATIC LIFE				HUMAN HEALTH	
	FRESHWATER		SALTWATER		Public Water Supply <sup>3</sup>	All Other Surface Waters <sup>4</sup>
	Acute <sup>1</sup>	Chronic <sup>2</sup>	Acute <sup>1</sup>	Chronic <sup>2</sup>		
<b>Chloroform (µg/l)</b> 67663 Known or suspected carcinogen; however, non-carcinogen calculation used and is protective of carcinogenic effects. Use 30Q5 as default design flow (see footnote 6.)					350	29,000
<b>2-Chloronaphthalene (µg/l)</b> 91587					1,700	4,300
<b>2-Chlorophenol (µg/l)</b> 95578					120	400
<b>Chlorpyrifos (µg/l)</b> 2921882	0.083	0.041	0.011	0.0056		
<b>Chromium III (µg/l)<sup>50</sup></b> 16065831 Freshwater values are a function of total hardness as calcium carbonate CaCO <sub>3</sub> mg/l and the WER. The minimum hardness allowed for use in the equation below shall be 25 and the maximum hardness shall be 400 even when the actual ambient hardness is less than 25 or greater than 400. <b>Freshwater acute criterion µg/l</b> $WER [e^{\{0.8190[\ln(\text{hardness})+3.7256]\}}] (CF_a)$ <b>Freshwater chronic criterion µg/l</b> $WER [e^{\{0.8190[\ln(\text{hardness})+0.6848]\}}] (CF_c)$ WER = Water Effect Ratio = 1 unless shown otherwise under 9 VAC 25-260-140.F and listed in 9 VAC 25-260-310 e = natural antilogarithm ln=natural logarithm CF <sub>a</sub> =0.316 CF <sub>c</sub> =0.860	570 (WER=1; CaCO <sub>3</sub> = 100)	74 (WER=1; CaCO <sub>3</sub> =100)			100 (total Cr)	
<b>Chromium VI (µg/l)<sup>9</sup></b> 18540299	16	11	1,100	50		
<b>Chrysene (µg/l)</b> 218019 Known or suspected carcinogen; human health criteria at risk level 10 <sup>-5</sup>					0.044	0.49

PARAMETER CAS Number	USE DESIGNATION					
	AQUATIC LIFE				HUMAN HEALTH	
	FRESHWATER		SALTWATER		Public Water Supply <sup>3</sup>	All Other Surface Waters <sup>4</sup>
	Acute <sup>1</sup>	Chronic <sup>2</sup>	Acute <sup>1</sup>	Chronic <sup>2</sup>		
<b>Copper (µg/l)<sup>5</sup></b> 7440508 Freshwater values are a function of total hardness as calcium carbonate CaCO <sub>3</sub> mg/l and the WER. The minimum hardness allowed for use in the equation below shall be 25 and the maximum hardness shall be 400 even when the actual ambient hardness is less than 25 or greater than 400. <b>Freshwater acute criterion (µg/l)</b> $WER [e^{\{0.9422[\ln(\text{hardness})]-1.700\}}] (CF_a)$ <b>Freshwater chronic criterion µg/l</b> $WER [e^{\{0.8545[\ln(\text{hardness})]-1.702\}}] (CF_c)$ WER = Water Effect Ratio =1 unless shown otherwise under 9 VAC 25-260-140.F and listed in 9 VAC 25-260-310. e = natural antilogarithm ln=natural logarithm CF <sub>a</sub> = 0.960 CF <sub>c</sub> = 0.960  Acute saltwater criterion is a 24-hour average not to be exceeded more than once every three years on the average.	13 WER=1 CaCO <sub>3</sub> =100	9.0 WER=1 CaCO <sub>3</sub> =100	9.3 WER=1	6.0 WER=1	1,300	
<b>Cyanide (µg/l)</b> 57125	22	5.2	1.0	1.0	700	220,000
<b>DDD (µg/l)</b> 72548 Known or suspected carcinogen; human health criteria at risk level 10 <sup>-5</sup>					0.0083	0.0084
<b>DDE (µg/l)</b> 72559 Known or suspected carcinogen; human health criteria at risk level 10 <sup>-5</sup>					0.0059	0.0059
<b>DDT (µg/l)</b> 50293 Known or suspected carcinogen; human health criteria at risk level 10 <sup>-5</sup>	1.1	0.0010	0.13	0.0010	0.0059	0.0059
<b>Demeton (µg/l)</b> 8065483		0.1		0.1		

PARAMETER CAS Number	USE DESIGNATION					
	AQUATIC LIFE				HUMAN HEALTH	
	FRESHWATER		SALTWATER		Public Water Supply <sup>3</sup>	All Other Surface Waters <sup>4</sup>
	Acute <sup>1</sup>	Chronic <sup>2</sup>	Acute <sup>1</sup>	Chronic <sup>2</sup>		
<b>Dibenz (a,h) anthracene (µg/l)</b> 53703 Known or suspected carcinogen; human health criteria at risk level 10 <sup>-5</sup>					0.044	0.49
<b>Dibutyl phthalate µg/l</b> 84742					2,700	12,000
<b>Dichloromethane (µg/l)</b> 75092 Known or suspected carcinogen; human health criteria at risk level 10 <sup>-5</sup> Synonym = Methylene Chloride					47	16,000
<b>1,2-Dichlorobenzene (µg/l)</b> 95501					2,700	17,000
<b>1,3- Dichlorobenzene (µg/l)</b> 541731					400	2,600
<b>1,4 Dichlorobenzene (µg/l)</b> 106467					400	2,600
<b>3,3 Dichlorobenzidine</b> 91941 Known or suspected carcinogen; human health criteria at risk level 10 <sup>-5</sup>					0.4	0.77
<b>Dichlorobromomethane (µg/l)</b> 75274 Known or suspected carcinogen; human health criteria at risk level 10 <sup>-5</sup>					5.6	460
<b>1,2 Dichloroethane (µg/l)</b> 107062 Known or suspected carcinogen; human health criteria at risk level 10 <sup>-5</sup>					3.8	990
<b>1,1 Dichloroethylene (µg/l)</b> 75354					310	17,000
<b>1,2-trans-dichloroethylene (µg/l)</b> 156605					700	140,000
<b>2,4 Dichlorophenol (µg/l)</b> 120832					93	790

PARAMETER CAS Number	USE DESIGNATION					
	AQUATIC LIFE				HUMAN HEALTH	
	FRESHWATER		SALTWATER		Public Water Supply <sup>3</sup>	All Other Surface Waters <sup>4</sup>
	Acute <sup>1</sup>	Chronic <sup>2</sup>	Acute <sup>1</sup>	Chronic <sup>2</sup>		
<b>2,4-Dichlorophenoxy acetic acid (2,4-D) (µg/l)</b> 94757					100	
<b>1,2-Dichloropropane (µg/l)</b> 78875 Known or suspected carcinogen; human health criteria at risk level 10 <sup>-5</sup>					5.2	390
<b>1,3-Dichloropropene (µg/l)</b> 542756					10	1,700
<b>Dieldrin (µg/l)</b> 60571 Known or suspected carcinogen; human health criteria at risk level 10 <sup>-5</sup>	0.24	0.056	0.71	0.0019	0.0014	0.0014
<b>Diethyl Phthalate (µg/l)</b> 84662					23,000	120,000
<b>Di-2-Ethylhexyl Phthalate (µg/l)</b> 117817 Known or suspected carcinogen; human health criteria at risk level 10 <sup>-5</sup> . Synonym = Bis2-Ethylhexyl Phthalate.					18	59
<b>2,4-Dimethylphenol (µg/l)</b> 105679					540	2,300
<b>Dimethyl Phthalate (µg/l)</b> 131113					313,000	2,900,000
<b>Di-n-Butyl Phthalate (µg/l)</b> 84742					2,700	12,000
<b>2,4-Dinitrophenol (µg/l)</b> 51285					70	14,000
<b>2-Methyl-4,6-Dinitrophenol (µg/l)</b> 534521					13.4	765
<b>2,4-Dinitrotoluene (µg/l)</b> 121142 Known or suspected carcinogen; human health criteria at risk level 10 <sup>-5</sup>					1.1	91

PARAMETER CAS Number	USE DESIGNATION					
	AQUATIC LIFE				HUMAN HEALTH	
	FRESHWATER		SALTWATER		Public Water Supply <sup>3</sup>	All Other Surface Waters <sup>4</sup>
	Acute <sup>1</sup>	Chronic <sup>2</sup>	Acute <sup>1</sup>	Chronic <sup>2</sup>		
<b>Dioxin 2, 3, 7, 8-tetrachlorodibenzo-p-dioxin (ppq)</b> 1746016 Criteria are based on a risk level of 10 <sup>-5</sup> and potency of 1.75 x 10 <sup>4</sup> mg/kg-day <sup>-1</sup> To calculate an average effluent permit limit, use mean annual stream flow.					1.2	1.2
<b>1,2-Diphenylhydrazine (µg/l)</b> 122667 Known or suspected carcinogen; human health criteria at risk level 10 <sup>-5</sup>					0.40	5.4
<b>Dissolved Oxygen (mg/l)</b> (See 9 VAC 25-260-50 and 9 VAC 25-260-55 )						
<b>Alpha-Endosulfan (µg/l)</b> 959988	0.22	0.056	0.034	0.0087	110	240
<b>Beta-Endosulfan (µg/l)</b> 33213659	0.22	0.056	0.034	0.0087	110	240
<b>Endosulfan Sulfate (µg/l)</b> 1031078					110	240
<b>Endrin (µg/l)</b> 72208	0.086	0.036	0.037	0.0023	0.76	0.81
<b>Endrin Aldehyde (µg/l)</b> 7421934					0.76	0.81
<b>Ethylbenzene (µg/l)</b> 100414					3,100	29,000
<b>Fecal Coliform</b> (see 9 VAC 25-260-160 and 9 VAC 25-260-170)						
<b>Fluoranthene (µg/l)</b> 206440					300	370
<b>Fluorene (µg/l)</b> 86737					1,300	14,000

PARAMETER CAS Number	USE DESIGNATION					
	AQUATIC LIFE				HUMAN HEALTH	
	FRESHWATER		SALTWATER		Public Water Supply <sup>3</sup>	All Other Surface Waters <sup>4</sup>
	Acute <sup>1</sup>	Chronic <sup>2</sup>	Acute <sup>1</sup>	Chronic <sup>2</sup>		
<b>Foaming Agents (µg/l)</b> Criterion measured as methylene blue active substances. Criterion to maintain acceptable taste, odor, or aesthetic quality of drinking water and applies at the drinking water intake.					500	
<b>Guthion (µg/l)</b> 86500		0.01		0.01		
<b>Heptachlor (µg/l)</b> 76448 Known or suspected carcinogen; human health criteria at risk level 10 <sup>-5</sup> .	0.52	0.0038	0.053	0.0036	0.0021	0.0021
<b>Heptachlor Epoxide (µg/l)</b> 1024573 Known or suspected carcinogen; human health criteria at risk level 10 <sup>-5</sup> .	0.52	0.0038	0.053	0.0036	0.0010	0.0011
<b>Hexachlorobenzene (µg/l)</b> 118741 Known or suspected carcinogen; human health criteria at risk level 10 <sup>-5</sup> .					0.0075	0.0077
<b>Hexachlorobutadiene (µg/l)</b> 87683 Known or suspected carcinogen; human health criteria at risk level 10 <sup>-5</sup> .					4.4	500
<b>Hexachlorocyclohexane Alpha-BHC (µg/l)</b> 319846 Known or suspected carcinogen; human health criteria at risk level 10 <sup>-5</sup> .					0.039	0.13
<b>Hexachlorocyclohexane Beta-BHC (µg/l)</b> 319857 Known or suspected carcinogen; human health criteria at risk level 10 <sup>-5</sup> .					0.14	0.46
<b>Hexachlorocyclohexane (µg/l) (Lindane) Gamma-BHC</b> 58899 Known or suspected carcinogen; human health criteria at risk level 10 <sup>-5</sup> .	0.95		0.16		0.19	0.63
<b>Hexachlorocyclopentadiene (µg/l)</b> 77474					240	17,000
<b>Hexachloroethane (µg/l)</b> 67721 Known or suspected carcinogen; human health criteria at risk level 10 <sup>-5</sup> .					19	89
<b>Hydrogen sulfide (µg/l)</b> 7783064		2.0		2.0		

PARAMETER CAS Number	USE DESIGNATION					
	AQUATIC LIFE				HUMAN HEALTH	
	FRESHWATER		SALTWATER		Public Water Supply <sup>3</sup>	All Other Surface Waters <sup>4</sup>
	Acute <sup>1</sup>	Chronic <sup>2</sup>	Acute <sup>1</sup>	Chronic <sup>2</sup>		
<b>Indeno (1,2,3,-cd) pyrene (µg/l)</b> 193395 Known or suspected carcinogen; human health criteria at risk level 10 <sup>-5</sup> .					0.044	0.49
<b>Iron (µg/l)</b> 7439896 Criterion to maintain acceptable taste, odor or aesthetic quality of drinking water and applies at the drinking water intake.					300	
<b>Isophorone (µg/l)</b> 78591 Known or suspected carcinogen; human health criteria at risk level 10 <sup>-5</sup> .					360	26,000
<b>Kepone (µg/l)</b> 143500		zero		zero		
<b>Lead (µg/l)<sup>5</sup></b> 7439921 Freshwater values are a function of total hardness as calcium carbonate CaCO <sub>3</sub> mg/l and the water effect ratio. The minimum hardness allowed for use in the equation below shall be 25 and the maximum hardness shall be 400 even when the actual ambient hardness is less than 25 or greater than 400. <b>Freshwater acute criterion (µg/l)</b> WER [e <sup>{1.273[ln(hardness)]-1.084}</sup> ] <b>Freshwater chronic criterion (µg/l)</b> WER [e <sup>{1.273[ln(hardness)]-3.259}</sup> ] WER = Water Effect Ratio =1 unless shown otherwise under 9 VAC 25-260-140.F and listed in 9 VAC 25-260-310 e = natural antilogarithm ln = natural logarithm	120 WER=1 CaCO <sub>3</sub> =100	14 WER=1 CaCO <sub>3</sub> =100	240 WER=1	9.3 WER=1	15	
<b>Malathion (µg/l)</b> 121755		0.1		0.1		
<b>Manganese (µg/l)</b> 7439965 Criterion to maintain acceptable taste, odor or aesthetic quality of drinking water and applies at the drinking water intake.					50	
<b>Mercury µg/l<sup>5</sup></b> 7439976	1.4	0.77	1.8	0.94	0.050	0.051

PARAMETER CAS Number	USE DESIGNATION					
	AQUATIC LIFE				HUMAN HEALTH	
	FRESHWATER		SALTWATER		Public Water Supply <sup>3</sup>	All Other Surface Waters <sup>4</sup>
	Acute <sup>1</sup>	Chronic <sup>2</sup>	Acute <sup>1</sup>	Chronic <sup>2</sup>		
<b>Methyl Bromide (µg/l)</b> 74839					48	4,000
<b>Methoxychlor (µg/l)</b> 72435		0.03		0.03	100	
<b>Mirex (µg/l)</b> 2385855		zero		zero		
<b>Monochlorobenzene (µg/l)</b> 108907					680	21,000
<b>Nickel (µg/L<sup>5</sup>)</b> 744002 Freshwater values are a function of total hardness as calcium carbonate CaCO <sub>3</sub> mg/l and the WER. The minimum hardness allowed for use in the equation below shall be 25 and the maximum hardness shall be 400 even when the actual ambient hardness is less than 25 or greater than 400. <b>Freshwater acute criterion µg/l</b> $WER [e^{\{0.8460[\ln(\text{hardness})] + 1.312\}}] (CF_a)$ <b>Freshwater chronic criterion (µg/l)</b> $WER [e^{\{0.8460[\ln(\text{hardness})] - 0.8840\}}] (CF_c)$ WER = Water Effect Ratio = unless shown otherwise under 9 VAC 25-260-140.F and listed in 9 VAC 25-250-310 e = natural antilogarithm ln = natural logarithm (CF <sub>a</sub> ) = 0.998 (CF <sub>c</sub> ) = 0.997	180 WER = 1 CaCO <sub>3</sub> = 100	20 WER = 1 CaCO <sub>3</sub> = 100	74 WER = 1	8.2 WER = 1	610	4,600
<b>Nitrate as N (µg/l)</b> 14797558					10,000	
<b>Nitrobenzene (µg/l)</b> 98953					17	1,900
<b>N-Nitrosodimethylamine (µg/l)</b> 62759 Known or suspected carcinogen; human health criteria at risk level 10 <sup>-5</sup> .					0.0069	81

PARAMETER CAS Number	USE DESIGNATION					
	AQUATIC LIFE				HUMAN HEALTH	
	FRESHWATER		SALTWATER		Public Water Supply <sup>3</sup>	All Other Surface Waters <sup>4</sup>
	Acute <sup>1</sup>	Chronic <sup>2</sup>	Acute <sup>1</sup>	Chronic <sup>2</sup>		
<b>N-Nitrosodiphenylamine (µg/l)</b> 86306 Known or suspected carcinogen; human health criteria at risk level 10 <sup>-5</sup>					50	160
<b>N-Nitrosodi-n-propylamine (µg/l)</b> 621647 Known or suspected carcinogen; human health criteria at risk level 10 <sup>-5</sup>					0.05	14
<b>Parathion (µg/l)</b> 56382	0.065	0.013				
<b>PCB 1260 (µg/l)</b> 11096825		0.014		0.030		
<b>PCB 1254 (µg/l)</b> 11097691		0.014		0.030		
<b>PCB 1248 (µg/l)</b> 12672296		0.014		0.030		
<b>PCB 1242 (µg/l)</b> 53469219		0.014		0.030		
<b>PCB 1232 (µg/l)</b> 11141165		0.014		0.030		
<b>PCB 1221 (µg/l)</b> 11104282		0.014		0.030		
<b>PCB 1016 (µg/l)</b> 12674112		0.014		0.030		
<b>PCB Total (µg/l)</b> 1336363 Known or suspected carcinogen; human health criteria at risk level 10 <sup>-5</sup>					0.0017	0.0017

PARAMETER CAS Number	USE DESIGNATION					
	AQUATIC LIFE				HUMAN HEALTH	
	FRESHWATER		SALTWATER		Public Water Supply <sup>3</sup>	All Other Surface Waters <sup>4</sup>
	Acute <sup>1</sup>	Chronic <sup>2</sup>	Acute <sup>1</sup>	Chronic <sup>2</sup>		
<b>Pentachlorophenol (µg/l)</b> 87865 Known or suspected carcinogen; human health criteria risk level at 10 <sup>-5</sup> <b>Freshwater acute criterion (µg/l)</b> e (1.005(pH)-4.8 69) <b>Freshwater chronic criterion (µg/l)</b> e (1.005(pH)-5.134)	8.7 pH = 7.0	6.7 pH = 7.0	13	7.9	2.8	82
<b>pH</b> See § 9VAC25-260-50						
<b>Phenol (µg/l)</b> 108952					21,000	4,600,000
<b>Phosphorus Elemental (µg/l)</b> 7723140				0.10		
<b>Pyrene (µg/l)</b> 129000					960	11,000
<b>Radionuclides</b> <b>Gross Alpha Particle Activity (pCi/L)</b> <b>Beta Particle &amp; Photon Activity (mrem/yr)</b> (formerly man-made radio nuclides) <b>Strontium 90 (pCi/L)</b> <b>Tritium (pCi/L)</b>					15 4 8 20,000	15 4 8 20,000
<b>Selenium (µg/l)<sup>50</sup></b> 7782492 WER shall not be used for freshwater acute and chronic criteria.	20	5.0	300 WER=1	71 WER=1	170	11,000
<b>Silver (µg/l)<sup>5</sup></b> 7440224 Freshwater values are a function of total hardness as calcium carbonate (CaCO <sub>3</sub> ) mg/l and the WER. The minimum hardness allowed for use in the equation below shall be 25 and the maximum hardness shall be 400 even when the actual ambient hardness is less than 25 or greater than 400.	3.4 WER=1; CaCO <sub>3</sub> = 100		2.0 WER=1			

PARAMETER CAS Number	USE DESIGNATION					
	AQUATIC LIFE				HUMAN HEALTH	
	FRESHWATER		SALTWATER		Public Water Supply <sup>3</sup>	All Other Surface Waters <sup>4</sup>
	Acute <sup>1</sup>	Chronic <sup>2</sup>	Acute <sup>1</sup>	Chronic <sup>2</sup>		
<b>Freshwater acute criterion (µg/l)</b> $WER [e^{\{1.72[\ln(\text{hardness})]-6.52\}}] (CF_a)$ WER = Water Effect Ratio = 1 unless shown otherwise under 9 VAC 25-260-140.F and listed in 9 VAC 25-260-310 e = natural antilogarithm ln = natural logarithm (CF <sub>a</sub> ) = 0.85						
<b>Sulfate (µg/l)</b> Criterion to maintain acceptable taste, odor or aesthetic quality of drinking water and applies at the drinking water intake.					250,000	
<b>Temperature</b> See 9 VAC 25-260-50						
<b>1,1,1,2-Tetrachloroethane (µg/l)</b> 79345 Known or suspected carcinogen; human health criteria at risk level 10 <sup>-5</sup>					1.7	110
<b>Tetrachloroethylene (µg/l)</b> 127184 Known or suspected carcinogen; human health criteria at risk level 10 <sup>-5</sup>					8.0	89
<b>Thallium (µg/l)</b> 7440280					1.7	6.3
<b>Toluene (µg/l)</b> 108883					6,800	200,000
<b>Total Dissolved Solids (µg/l)</b> Criterion to maintain acceptable taste, odor or aesthetic quality of drinking water and applies at the drinking water intake.					500,000	
<b>Toxaphene (µg/l)</b> 8001352 The chronic aquatic life criteria have been calculated to also protect wildlife from harmful effects through ingestion of contaminated tissue. Known or suspected carcinogen; human health criteria at risk level 10 <sup>-5</sup>	0.73	0.0002	0.21	0.0002	0.0073	0.0075
<b>Tributyltin (µg/l)</b> 60105	0.46	0.063	0.38	0.001		

PARAMETER CAS Number	USE DESIGNATION					
	AQUATIC LIFE				HUMAN HEALTH	
	FRESHWATER		SALTWATER		Public Water Supply <sup>3</sup>	All Other Surface Waters <sup>4</sup>
	Acute <sup>1</sup>	Chronic <sup>2</sup>	Acute <sup>1</sup>	Chronic <sup>2</sup>		
<b>1, 2, 4 Trichlorobenzene (µg/l)</b> 120821					260	940
<b>1,1,2-Trichloroethane (µg/l)</b> 79005 Known or suspected carcinogen; human health criteria at risk level 10 <sup>-5</sup>					6.0	420
<b>Trichloroethylene (µg/l)</b> 79016 Known or suspected carcinogen; human health criteria at risk level 10 <sup>-5</sup>					27	810
<b>2, 4, 6 -Trichlorophenol</b> 88062 Known or suspected carcinogen; human health criteria at risk level 10 <sup>-5</sup>					21	65
<b>2-(2, 4, 5 -Trichlorophenoxy propionic acid (Silvex) (µg/l)</b>					50	
<b>Vinyl Chloride (µg/l)</b> 75014 Known or suspected carcinogen; human health criteria at risk level 10 <sup>-5</sup>					0.23	61
<b>Zinc (µg/l)<sup>5</sup></b> Freshwater values are a function of total hardness as calcium carbonate (CaCO <sub>3</sub> ) mg/l and the WER. The minimum hardness allowed for use in the equation below shall be 25 and the maximum, hardness shall be 400 even when the actual ambient hardness is less than 25 or greater than 400 . <b>Freshwater acute criterion µg/l</b> WER [e <sup>{0.8473[ln(hardness)]+0.884}</sup> ] (CF <sub>a</sub> ) <b>Freshwater chronic criterion µg/l</b> WER [e <sup>{0.8473[ln(hardness)]+0.884}</sup> ] (CF <sub>c</sub> ) WER =Water Effect Ratio =1 unless shown otherwise under 9 VAC 25-260-140.F and listed in 9 VAC 25-260-310 e = base e exponential function. ln = log normal function CF <sub>a</sub> = 0.978 CF <sub>c</sub> = 0.986	120 WER=1 CaCO <sub>3</sub> = 100	120 WER=1 CaCO <sub>3</sub> = 100	90 WER=1	81 WER=1	9,100	69,000

---

<sup>1</sup> One hour average concentration not to be exceeded more than once every 3 years on the average, unless otherwise noted.

<sup>2</sup> Four-day average concentration not to be exceeded more than once every 3 years on the average, unless otherwise noted.

<sup>3</sup> Criteria have been calculated to protect human health from toxic effects through drinking water and fish consumption, unless otherwise noted and apply in segments designated as PWS in 9 VAC 25-260-390-540.

<sup>4</sup> Criteria have been calculated to protect human health from toxic effects through fish consumption, unless otherwise noted and apply in all other surface waters not designated as PWS in 9 VAC 25-260-390-540.

<sup>5</sup> Acute and chronic saltwater and freshwater aquatic life criteria apply to the biologically available form of the metal and apply as a function of the pollutant's water effect ratio (WER) as defined in 9 VAC 25-260-140 F (WER X criterion.) Metals measured as dissolved shall be considered to be biologically available, or, because local receiving water characteristics may otherwise affect the biological availability of the metal, the biologically available equivalent measurement of the metal can be further defined by determining a Water Effect Ratio (WER) and multiplying the numerical value shown in 9 VAC 25-260-140 B by the WER. Refer to 9 VAC 25-260-140 F. Values displayed above in the table are examples and correspond to a (WER) of 1.0. Metals criteria have been adjusted to convert the total recoverable fraction to dissolved fraction using a conversion factor. Criteria that change with hardness have the conversion factor listed in the table above.

6 = The flows listed below are default design flows for calculating steady state waste load allocations unless statistically valid methods are employed which demonstrate compliance with the duration and return frequency of the water quality criteria.

**Aquatic Life:**

Acute criteria	1Q10
Chronic criteria	7Q10
Chronic criteria (ammonia)	30Q10

**Human Health:**

Non-carcinogens	30Q5
Carcinogens	Harmonic mean (An exception to this is for the carcinogen dioxin. The applicable stream flow for dioxin is the mean annual stream flow.)

The following are defined for this section:

"1Q10" means the lowest flow averaged over a period of one day which on a statistical basis can be expected to occur once every 10 climatic years.

"7Q10" means the lowest flow averaged over a period of seven consecutive days that can be statistically expected to occur once every 10 climatic years.

"30Q5" means the lowest flow averaged over a period of 30 consecutive days that can be statistically expected to occur once every five climatic years.

"30Q10" means the lowest flow averaged over a period of 30 consecutive days that can be statistically expected to occur once every 10 climatic years.

"Averaged" means an arithmetic mean.

"Climatic year" means a year beginning on April 1 and ending on March 31.

C. Application of freshwater and saltwater numerical criteria.

The numerical water quality criteria listed in subsection B of this section (excluding dissolved oxygen, pH, temperature) shall be applied according to the following classes of waters (see 9 VAC 25-260-50) and boundary designations:

CLASS OF WATERS	NUMERICAL CRITERIA
I and II (Estuarine Waters)	Saltwater criteria apply
II (Transition Zone)	More stringent of either the freshwater or saltwater criteria apply
II (Tidal Freshwater,) III, IV, V, VI and VII	Freshwater criteria apply

The following describes the boundary designations for Class II, (estuarine, transition zone and tidal freshwater waters) by river basin:

1. Rappahannock Basin.

Tidal freshwater is from the fall line of the Rappahannock River to Buoy 37 near Tappahannock, Virginia, including all tidal tributaries that enter the tidal freshwater Rappahannock River.

Transition zone is from Buoy 37 to Buoy 11 near Morattico, Virginia, including all tidal tributaries that enter the transition zone of the Rappahannock River.

Estuarine waters are from Buoy 11 to the mouth of the Rappahannock River (Buoy 6), including all tidal tributaries that enter the estuarine waters of the Rappahannock River.

2. York Basin.

Tidal freshwater is from the fall line of the Mattaponi River to Clifton, Virginia, and from the fall line of the Pamunkey River to Sweet Hall Landing, Virginia, including all tidal tributaries that enter the tidal freshwaters of the Mattaponi and Pamunkey Rivers.

Transition zone of the Mattaponi River is from Clifton, Virginia to the York River and the transition zone of the Pamunkey River is from Sweet Hall Landing, Virginia, to the York River. The transition zone for the York River is from West Point, Virginia, to Buoy 13 near Poropotank Bay. All tidal tributaries that enter the transition zones of the Mattaponi, Pamunkey, and York Rivers are themselves in the transition zone.

Estuarine waters are from Buoy 13 to the mouth of the York River (Tue Marsh Light) including all tidal tributaries that enter the estuarine waters of the York River.

3. James Basin.

Tidal Freshwater is from the fall line of the James River to the confluence of the Chickahominy River Buoy 70, including all tidal tributaries that enter the tidal freshwater James River.

Transition zone is from (Buoy 70) to Buoy 47 near Jamestown Island including all tidal tributaries that enter the transition zone of the James River.

Estuarine waters are from Buoy 47 to the mouth of the James River (Buoy 25) including all tidal tributaries that enter the estuarine waters of the James River.

4. Potomac Basin.

Tidal Freshwater includes all tidal tributaries that enter the Potomac River from its fall line to Buoy 43 near Quantico, Virginia.

Transition zone includes all tidal tributaries that enter the Potomac River from Buoy 43 to Buoy 33 near Dahlgren, Virginia.

Estuarine waters includes all tidal tributaries that enter the Potomac River from Buoy 33 to the mouth of the Potomac River (Buoy 44B.)

5. Chesapeake Bay, Atlantic Ocean, and small coastal basins.

Estuarine waters include the Atlantic Ocean tidal tributaries, and the Chesapeake Bay and its small coastal basins from the Virginia state line to the mouth of the bay (a line from Cape Henry drawn through Buoys 3 and 8 to Fishermans Island), and its tidal tributaries, excluding the Potomac tributaries and those tributaries listed above.

6. Chowan River Basin.

Tidal freshwater includes the Northwest River and its tidal tributaries from the Virginia-North Carolina state line to the free flowing portion, the Blackwater River and its tidal tributaries from the Virginia-North Carolina state line to the end of tidal waters at approximately state route 611 at river mile 20.90, the Nottoway River and its tidal tributaries from the Virginia-North Carolina state line to the end of tidal waters at approximately Route 674, and the North Landing River and its tidal tributaries from the Virginia-North Carolina state line to the Great Bridge Lock.

Transition zone includes Back Bay and its tributaries in the City of Virginia Beach to the Virginia-North Carolina state line.

D. Site-specific modifications to numerical water quality criteria.

1. The board may consider site-specific modifications to numerical water quality criteria in subsection B of this section where the applicant or permittee demonstrates that the alternate numerical water quality criteria are sufficient to protect all designated uses (see 9 VAC 25-260-10) of that particular surface water segment or body.

2. Any demonstration for site-specific human health criteria shall be restricted to a reevaluation of the bioconcentration or bioaccumulation properties of the pollutant. The exceptions to this restriction are for site-specific criteria for taste, odor, and aesthetic compounds noted by double asterisks in subsection B of this section and nitrates.

3. Site-specific temperature requirements are found in 9 VAC 25-260-90.

4. Procedures for promulgation and review of site-specific modifications to numerical water quality criteria resulting from subdivisions 1 and 2 of this subsection.

a. Proposals describing the details of the site-specific study shall be submitted to the board's staff for approval prior to commencing the study.

b. Any site-specific modification shall be promulgated as a regulation in accordance with the Administrative Process Act. All site-specific modifications shall be listed in 9 VAC 25-260-310 (Special standards and requirements).

E. Variances to water quality standards.

1. A variance from numeric criteria may be granted to a discharger if it can be demonstrated that one or more of the conditions in 9 VAC 25-260-10 G limit the attainment of one or more specific designated uses.

a. Variances shall apply only to the discharger to whom they are granted and shall be reevaluated and either continued, modified or revoked at the time of permit issuance. At that time the permittee shall make a showing that the conditions for granting the variance still apply.

b. Variances shall be described in the public notice published for the permit. The decision to approve a variance shall be subject to the public participation requirements of the Virginia Pollutant Discharge Elimination System (VPDES) Permit Regulation, 9 VAC 25-31 (Permit Regulation).

c. Variances shall not prevent the maintenance and protection of existing uses or exempt the discharger or regulated activity from compliance with other appropriate technology or water quality-based limits or best management practices.

d. Variances granted under this section shall not apply to new discharges.

e. Variances shall be submitted by the department's Division of Scientific Research or its successors to the

Environmental Protection Agency for review and approval/disapproval.

f. A list of variances granted shall be maintained by the department's Division of Scientific Research or its successors.

2. None of the variances in subsection E of this section shall apply to the halogen ban section 9 VAC 25-260-110 or temperature criteria in 9 VAC 25-260-50 if superseded by § 316a of the Clean Water Act requirements. No variances in subsection E of this section shall apply to the criteria that are designed to protect human health from carcinogenic and noncarcinogenic toxic effects subsection B of this section with the exception of the metals, and the taste, odor, and aesthetic compounds noted by double asterisks and nitrates, listed in subsection B of this section.

F. Water effect ratio.

1. A water effects ratio (WER) shall be determined by measuring the effect of receiving water (as it is or will be affected by any discharges) on the bioavailability or toxicity of a metal by using standard test organisms and a metal to conduct toxicity tests simultaneously in receiving water and laboratory water. The ratio of toxicities of the metal(s) in the two waters is the WER (toxicity in receiving water divided by toxicity in laboratory water = WER). Once an acceptable WER for a metal is established, the numerical value for the metal in subsection B of this section is multiplied by the WER to produce an instream concentration that will protect designated uses. This instream concentration shall be utilized in permitting decisions.

2. The WER shall be assigned a value of 1.0 unless the applicant or permittee demonstrates to the department's satisfaction in a permit proceeding that another value is appropriate, or unless available data allow the department to compute a WER for the receiving waters. The applicant or permittee is responsible for proposing and conducting the study to develop a WER. The study may require multiple testing over several seasons. The applicant or permittee shall obtain the department's Division of Scientific Research or its successor approval of the study protocol and the final WER.

3. The Permit Regulation at 9 VAC 25-31-230 C requires that permit limits for metals be expressed as total recoverable measurements. To that end, the study used to establish the WER may be based on total recoverable measurements of the metals.

4. The Environmental Protection Agency views the WER in any particular case as a site-specific criterion. Therefore, the department's Division of Scientific Research or its successor shall submit the results of the study to the Environmental Protection Agency for review and approval/disapproval within 30 days of the receipt of certification from the state's Office of the Attorney General. Nonetheless, the WER is established in a permit proceeding, shall be described in the public notice associated with the permit proceeding, and applies only to the applicant or permittee in that proceeding. The department's action to approve or disapprove a WER is a case decision, not an amendment to the present regulation.

The decision to approve or disapprove a WER shall be subject to the public participation requirements of the Permit Regulation, 9 VAC 25-31-260 et seq. A list of final WERs will be maintained by the department's Division of Scientific Research or its successor.

5. A WER shall not be used for the freshwater and saltwater chronic mercury criteria or the freshwater acute and chronic selenium criteria.

**9 VAC 25-260-150. (Repealed.)**