Maryland's 2023 Interim Update of Water Quality Standards

Last Updated: October 23, 2023

Overview of the 2023 Interim Update to Water Quality Standards

COMAR 26.08.02.03-2 Numerical Criteria for Toxic Substances Waters

Summary of Changes: The 2023 Interim Update proposes corrections to three technical errors within COMAR 26.08.02.03-2. The errors were identified after the Department's regulatory proposal for the 2019 Triennial Review that went public with the March 11, 2022 edition of the Maryland Register. These errors were not found until after the Notice of Final Action and the changes took effect in Code of Maryland Regulations. MDE is now correcting these oversights in the current water quality standards amendment action, referred to as the 2023 Interim Update.

- First, the Department is proposing corrections to errors found in the previously proposed freshwater ammonia criteria. The Department proposes the submission of the correct version for the equation used to calculate the chronic ammonia criteria for when early life stages of freshwater fish and mussels are present, as well as three reference tables of chronic ammonia criteria values. These corrections will allow COMAR regulation to match the correct values and equations listed in EPA's 2013 National Criteria for Ammonia in Freshwater.
- Second, in response to EPA's comments in the approval of the 2019 Triennial Review, the Department is re-adding and further clarifying a footnote related to the criteria for pentachlorophenol (PCP) for Table 6, "Toxic Substances for Ambient Water Quality Criteria — Pesticides and Chlorinated Compounds" in §G of the regulation. In the 2019 Triennial Review, MDE deleted a footnote related to PCP with the intention to delete the indication that PCP is affected by hardness, but inadvertently also deleted the indication that PCP is affected by pH. The footnote addition for the current proposed update clarifies the influence of pH on PCP toxicity, consistent with EPA's Clean Water Act 304(a) recommendation for PCP.
- Finally, errors were found in table references in §D and §F of the regulation. The proposed changes include corrections to provide the correct table references within those sections.

Specific changes to the regulation, COMAR 26.08.02.03-2 Numerical Criteria for Toxic Substances Waters, are shown on the next page. Please note that when reviewing amended text, [text in brackets is deleted] while *text in italics* is a new addition.

Title 26. DEPARTMENT OF THE ENVIRONMENT

Subtitle 8. WATER POLLUTION

Chapter 1. WATER QUALITY

Authority: Environment Article, §9-303.1, 9-313—9-316, 9-319, 9-320—9-325, 9-327, and 9-328, Annotated Code of Maryland

.03-2 Numerical Criteria for Toxic Substances in Surface Waters.

A.—C. (text unchanged.)

D. The toxicity of certain substances in Tables 1 and **[**4**]***6* of §G of this regulation is increased or decreased by hardness or pH. For these toxic substances:

(1)—(4) (text unchanged.)

E. (text unchanged.)

F. Acute and chronic numeric toxic substance criteria for fresh, estuarine, and salt water aquatic life protection and for human health protection are shown in Tables 1—**[**4**]***6* of §G. For the instream application of the acute and chronic criteria for the protection of aquatic life in Tables 1—**[**4**]***6* of §G of this regulation:

(1)—(3) (text unchanged.)

G. Tables of Ambient Water Quality Criteria.

(1)—(5) (text unchanged.)

(6) Table 6. Toxic Substances for Ambient Water Quality Criteria — Pesticides and Chlorinated Compounds.

Substance	CAS#	Aquatic Life (µg/L)				Human Health for Consumption of:		
		Fresh Water		Salt Water		Drinking Water + Organism (µg/L)	Organism Only (µg/L)	Drinking Water MCL (mg/L)
		Acute	Chronic	Acute	Chronic			
2, 3, 7, 8-TCDD (Dioxin)	1746016					0.00000005[a]	0.00000051[a]	3×10^{-8}
4,4'-DDD	72548					0.0012[a]	0.0012[a]	
4,4'-DDE	72559					0.0018[a]	0.0018[a]	
4,4'-DDT	50293	1.1	0.001	0.13	0.001	0.0003[a]	0.0003[a]	
Aldrin	309002	3		1.3		0.0000077[a]	0.0000077[a]	
alpha-BHC	319846					0.036[a]	0.039[a]	
alpha-Endosulfan	959988	0.22	0.056	0.034	0.0087	20	30	
Atrazine	1912249					3		0.003
beta-BHC	319857					0.08[a]	0.14[a]	
beta-Endosulfan	33213659	0.22	0.056	0.034	0.0087	20	40	
Carbaryl	63252	2.1	2.1	1.6				
Chlordane	57749	2.4	0.0043	0.09	0.004	0.0031[a]	0.0032[a]	0.002
Chlorpyrifos	2921882	0.083	0.041	0.011	0.0056			
Diazinon	333415	0.17	0.17	0.82	0.82			
Dieldrin	60571	0.24	0.056	0.71	0.0019	0.000012[a]	0.000012[a]	
Endosulfan Sulfate	1031078					20	40	
Endrin	72208	0.086	0.036	0.037	0.0023	0.059	0.060	0.002
Endrin Aldehyde	7421934					1	1	

Substance	CAS#	Aquatic Life (µg/L)				Human Health for Consumption of:		
		Fresh Water		Salt Water		Drinking Water + Organism (µg/L)	Organism Only (µg/L)	Drinking Water MCL (mg/L)
		Acute	Chronic	Acute	Chronic			
gamma-BHC (Lindane)	58899	0.95		0.16		4.2	4.4	0.0002
Heptachlor	76448	0.52	0.0038	0.053	0.0036	0.000059[a]	0.000059[a]	0.0004
Heptachlor Epoxide	1024573	0.52	0.0038	0.053	0.0036	0.00032[a]	0.00032[a]	0.0002
Polychlorinated Biphenyls PCBs			0.014		0.03	0.00064 [a]	0.00064 [a]	0.0005
Toxaphene	8001352	0.73	0.002	0.21	0.002	0.007[a]	0.0071[a]	0.003
Tributyltin (TBT)		0.46	0.072	0.42	0.0074			
Pentachlorobenzene	608935					0.1	0.1	
Pentachlorophenol (PCP)[1]	87865	19	15	13	7.9	2.7[a]	30[a]	0.001

[1]*The freshwater aquatic life criteria for PCP are expressed as a function of pH. Refer to §D of this regulation.*

[a] Criterion is based on a carcinogenic risk level of 10^{-5}.

* Drinking water MCLs apply to Public Water Supply designated waters only.

H. (text unchanged.)

I. Chronic Numeric Toxic Substance Criteria for Ammonia, Expressed as a 30-day Average, for the Protection of Fresh Water Aquatic Life.

(1)—(4) (text unchanged.)

(5) Table 1. Chronic Ammonia Criteria for Waters Where Freshwater Fish Early Life Stages May Be Present (milligrams of nitrogen per liter).[1.] [

	Temperature (°C)																							
pH	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
6.5	4.9	4.6	4.3	4.0	3.8	3.6	3.3	3.1	2.9	2.8	2.6	2.4	2.3	2.1	2.0	1.9	1.8	1.6	1.5	1.4	1.4	1.3	1.2	1.1
6.6	4.8	4.5	4.3	4.0	3.7	3.5	3.3	3.1	2.9	2.7	2.5	2.4	2.2	2.1	2.0	1.8	1.7	1.6	1.5	1.4	1.3	1.2	1.2	1.1
6.7	4.7	4.4	4.2	3.9	3.7	3.4	3.2	3.0	2.8	2.7	2.5	2.3	2.2	2.1	1.9	1.8	1.7	1.6	1.5	1.4	1.3	1.2	1.1	1.1
6.8	4.6	4.3	4.1	3.8	3.6	3.4	3.1	3.0	2.8	2.6	2.4	2.3	2.1	2.0	1.9	1.8	1.7	1.5	1.5	1.4	1.3	1.2	1.1	1.1
6.9	4.5	4.2	4.0	3.7	3.5	3.3	3.1	2.9	2.7	2.5	2.4	2.2	2.1	1.9	1.8	1.7	1.6	1.5	1.4	1.3	1.2	1.2	1.1	1.0
7	4.3	4.1	3.8	3.6	3.4	3.1	2.9	2.8	2.6	2.4	2.3	2.1	2.0	1.9	1.8	1.7	1.5	1.5	1.4	1.3	1.2	1.1	1.1	1.0
7.1	4.2	3.9	3.7	3.4	3.2	3.0	2.8	2.6	2.5	2.3	2.2	2.0	1.9	1.8	1.7	1.6	1.5	1.4	1.3	1.2	1.1	1.1	1.0	0.9
7.2	3.9	3.7	3.5	3.3	3.1	2.9	2.7	2.5	2.4	2.2	2.1	1.9	1.8	1.7	1.6	1.5	1.4	1.3	1.2	1.2	1.1	1.0	1.0	0.9

	Temperature (℃)																							
7.3	3.7	3.5	3.3	3.1	2.9	2.7	2.5	2.4	2.2	2.1	1.9	1.8	1.7	1.6	1.5	1.4	1.3	1.2	1.2	1.1	1.0	1.0	0.9	0.8
7.4	3.5	3.2	3.0	2.8	2.7	2.5	2.3	2.2	2.1	1.9	1.8	1.7	1.6	1.5	1.4	1.3	1.2	1.2	1.1	1.0	1.0	0.9	0.8	0.8
7.5	3.2	3.0	2.8	2.6	2.5	2.3	2.2	2.0	1.9	1.8	1.7	1.6	1.5	1.4	1.3	1.2	1.1	1.1	1.0	0.9	0.9	0.8	0.8	0.7
7.6	2.9	2.7	2.5	2.4	2.2	2.1	2.0	1.8	1.7	1.6	1.5	1.4	1.3	1.2	1.2	1.1	1.0	1.0	0.9	0.8	0.8	0.7	0.7	0.7
7.7	2.6	2.4	2.3	2.1	2.0	1.9	1.8	1.6	1.5	1.4	1.4	1.3	1.2	1.1	1.0	1.0	0.9	0.9	0.8	0.8	0.7	0.7	0.6	0.6
7.8	2.3	2.1	2.0	1.9	1.8	1.7	1.5	1.5	1.4	1.3	1.2	1.1	1.1	1.0	0.9	0.9	0.8	0.8	0.7	0.7	0.6	0.6	0.6	0.5
7.9	2.0	1.9	1.7	1.6	1.5	1.4	1.4	1.3	1.2	1.1	1.0	1.0	0.9	0.9	0.8	0.8	0.7	0.7	0.6	0.6	0.5	0.5	0.5	0.5
8	1.7	1.6	1.5	1.4	1.3	1.2	1.2	1.1	1.0	1.0	0.9	0.8	0.8	0.7	0.7	0.7	0.6	0.6	0.5	0.5	0.5	0.4	0.4	0.4
8.1	1.5	1.4	1.3	1.2	1.1	1.1	1.0	0.9	0.9	0.8	0.8	0.7	0.7	0.6	0.6	0.6	0.5	0.5	0.5	0.4	0.4	0.4	0.4	0.3
8.2	1.2	1.2	1.1	1.0	1.0	0.9	0.8	0.8	0.7	0.7	0.6	0.6	0.6	0.5	0.5	0.5	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.3
8.3	1.0	1.0	0.9	0.8	0.8	0.7	0.7	0.7	0.6	0.6	0.5	0.5	0.5	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.2	0.2
8.4	0.9	0.8	0.7	0.7	0.7	0.6	0.6	0.5	0.5	0.5	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2
8.5	0.7	0.7	0.6	0.6	0.5	0.5	0.5	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
8.6	0.6	0.5	0.5	0.5	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1
8.7	0.5	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1
8.8	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
8.9	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
9	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1

	Temperature (℃)																							
pH	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*	*17*	*18*	*19*	*20*	*21*	*22*	*23*	*24*	*25*	*26*	*27*	*28*	*29*	*30*
6.5	*4.92*	*4.61*	*4.33*	*4.06*	*3.80*	*3.57*	*3.34*	*3.13*	*2.94*	*2.75*	*2.58*	*2.42*	*2.27*	*2.13*	*2.00*	*1.87*	*1.75*	*1.64*	*1.54*	*1.45*	*1.36*	*1.27*	*1.19*	*1.12*
6.6	*4.85*	*4.54*	*4.26*	*3.99*	*3.75*	*3.51*	*3.29*	*3.09*	*2.89*	*2.71*	*2.54*	*2.38*	*2.24*	*2.10*	*1.97*	*1.84*	*1.73*	*1.62*	*1.52*	*1.42*	*1.33*	*1.25*	*1.17*	*1.10*
6.7	*4.76*	*4.46*	*4.18*	*3.92*	*3.68*	*3.45*	*3.23*	*3.03*	*2.84*	*2.66*	*2.50*	*2.34*	*2.19*	*2.06*	*1.93*	*1.81*	*1.70*	*1.59*	*1.49*	*1.40*	*1.31*	*1.23*	*1.15*	*1.08*
6.8	*4.65*	*4.36*	*4.08*	*3.83*	*3.59*	*3.37*	*3.16*	*2.96*	*2.77*	*2.60*	*2.44*	*2.29*	*2.14*	*2.01*	*1.88*	*1.77*	*1.66*	*1.55*	*1.46*	*1.37*	*1.28*	*1.20*	*1.13*	*1.05*
6.9	*4.52*	*4.23*	*3.97*	*3.72*	*3.49*	*3.27*	*3.07*	*2.88*	*2.70*	*2.53*	*2.37*	*2.22*	*2.08*	*1.95*	*1.83*	*1.72*	*1.61*	*1.51*	*1.42*	*1.33*	*1.24*	*1.17*	*1.09*	*1.03*
7	*4.36*	*4.09*	*3.84*	*3.60*	*3.37*	*3.16*	*2.96*	*2.78*	*2.60*	*2.44*	*2.29*	*2.15*	*2.01*	*1.89*	*1.77*	*1.66*	*1.56*	*1.46*	*1.37*	*1.28*	*1.20*	*1.13*	*1.06*	*0.99*
7.1	*4.18*	*3.92*	*3.68*	*3.45*	*3.23*	*3.03*	*2.84*	*2.66*	*2.50*	*2.34*	*2.20*	*2.06*	*1.93*	*1.81*	*1.70*	*1.59*	*1.49*	*1.40*	*1.31*	*1.23*	*1.15*	*1.08*	*1.01*	*0.95*

7.2	*3.98*	*3.73*	*3.50*	*3.28*	*3.07*	*2.88*	*2.70*	*2.53*	*2.38*	*2.23*	*2.09*	*1.96*	*1.84*	*1.72*	*1.61*	*1.51*	*1.42*	*1.33*	*1.25*	*1.17*	*1.10*	*1.03*	*0.96*	*0.90*
7.3	*3.75*	*3.51*	*3.29*	*3.09*	*2.90*	*2.72*	*2.55*	*2.39*	*2.24*	*2.10*	*1.97*	*1.84*	*1.73*	*1.62*	*1.52*	*1.43*	*1.34*	*1.25*	*1.17*	*1.10*	*1.03*	*0.97*	*0.91*	*0.85*
7.4	*3.49*	*3.28*	*3.07*	*2.88*	*2.70*	*2.53*	*2.37*	*2.23*	*2.09*	*1.96*	*1.83*	*1.72*	*1.61*	*1.51*	*1.42*	*1.33*	*1.25*	*1.17*	*1.10*	*1.03*	*0.96*	*0.90*	*0.85*	*0.79*
7.5	*3.22*	*3.02*	*2.83*	*2.66*	*2.49*	*2.33*	*2.19*	*2.05*	*1.92*	*1.80*	*1.69*	*1.59*	*1.49*	*1.39*	*1.31*	*1.22*	*1.15*	*1.08*	*1.01*	*0.95*	*0.89*	*0.83*	*0.78*	*0.73*
7.6	*2.94*	*2.75*	*2.58*	*2.42*	*2.27*	*2.13*	*1.99*	*1.87*	*1.75*	*1.64*	*1.54*	*1.44*	*1.35*	*1.27*	*1.19*	*1.12*	*1.05*	*0.98*	*0.92*	*0.86*	*0.81*	*0.76*	*0.71*	*0.67*
7.7	*2.64*	*2.48*	*2.32*	*2.18*	*2.04*	*1.91*	*1.79*	*1.68*	*1.58*	*1.48*	*1.39*	*1.30*	*1.22*	*1.14*	*1.07*	*1.00*	*0.94*	*0.88*	*0.83*	*0.78*	*0.73*	*0.68*	*0.64*	*0.60*
7.8	*2.35*	*2.20*	*2.07*	*1.94*	*1.82*	*1.70*	*1.60*	*1.50*	*1.40*	*1.32*	*1.23*	*1.16*	*1.08*	*1.02*	*0.95*	*0.89*	*0.84*	*0.79*	*0.74*	*0.69*	*0.65*	*0.61*	*0.57*	*0.53*
7.9	*2.07*	*1.94*	*1.82*	*1.70*	*1.60*	*1.50*	*1.40*	*1.32*	*1.23*	*1.16*	*1.08*	*1.02*	*0.95*	*0.89*	*0.84*	*0.79*	*0.74*	*0.69*	*0.65*	*0.61*	*0.57*	*0.53*	*0.50*	*0.47*
8	*1.80*	*1.68*	*1.58*	*1.48*	*1.39*	*1.30*	*1.22*	*1.14*	*1.07*	*1.01*	*0.94*	*0.88*	*0.83*	*0.78*	*0.73*	*0.68*	*0.64*	*0.60*	*0.56*	*0.53*	*0.49*	*0.46*	*0.43*	*0.41*
8.1	*1.55*	*1.45*	*1.36*	*1.28*	*1.20*	*1.12*	*1.05*	*0.99*	*0.92*	*0.87*	*0.81*	*0.76*	*0.71*	*0.67*	*0.63*	*0.59*	*0.55*	*0.52*	*0.49*	*0.45*	*0.43*	*0.40*	*0.37*	*0.35*
8.2	*1.32*	*1.24*	*1.16*	*1.09*	*1.02*	*0.96*	*0.90*	*0.84*	*0.79*	*0.74*	*0.69*	*0.65*	*0.61*	*0.57*	*0.54*	*0.50*	*0.47*	*0.44*	*0.41*	*0.39*	*0.36*	*0.34*	*0.32*	*0.30*
8.3	*1.13*	*1.05*	*0.99*	*0.93*	*0.87*	*0.82*	*0.76*	*0.72*	*0.67*	*0.63*	*0.59*	*0.55*	*0.52*	*0.49*	*0.46*	*0.43*	*0.40*	*0.38*	*0.35*	*0.33*	*0.31*	*0.29*	*0.27*	*0.26*
8.4	*0.95*	*0.89*	*0.84*	*0.78*	*0.74*	*0.69*	*0.65*	*0.61*	*0.57*	*0.53*	*0.50*	*0.47*	*0.44*	*0.41*	*0.39*	*0.36*	*0.34*	*0.32*	*0.30*	*0.28*	*0.26*	*0.25*	*0.23*	*0.22*
8.5	*0.80*	*0.75*	*0.71*	*0.66*	*0.62*	*0.58*	*0.55*	*0.51*	*0.48*	*0.45*	*0.42*	*0.40*	*0.37*	*0.35*	*0.33*	*0.31*	*0.29*	*0.27*	*0.25*	*0.24*	*0.22*	*0.21*	*0.19*	*0.18*
8.6	*0.68*	*0.64*	*0.60*	*0.56*	*0.52*	*0.49*	*0.46*	*0.43*	*0.41*	*0.38*	*0.36*	*0.33*	*0.31*	*0.29*	*0.28*	*0.26*	*0.24*	*0.23*	*0.21*	*0.20*	*0.19*	*0.18*	*0.16*	*0.15*
8.7	*0.57*	*0.54*	*0.50*	*0.47*	*0.44*	*0.42*	*0.39*	*0.37*	*0.34*	*0.32*	*0.30*	*0.28*	*0.27*	*0.25*	*0.23*	*0.22*	*0.20*	*0.19*	*0.18*	*0.17*	*0.16*	*0.15*	*0.14*	*0.13*
8.8	*0.49*	*0.46*	*0.43*	*0.40*	*0.38*	*0.35*	*0.33*	*0.31*	*0.29*	*0.27*	*0.26*	*0.24*	*0.23*	*0.21*	*0.20*	*0.19*	*0.17*	*0.16*	*0.15*	*0.14*	*0.13*	*0.13*	*0.12*	*0.11*
8.9	*0.42*	*0.39*	*0.37*	*0.34*	*0.32*	*0.30*	*0.28*	*0.27*	*0.25*	*0.23*	*0.22*	*0.21*	*0.19*	*0.18*	*0.17*	*0.16*	*0.15*	*0.14*	*0.13*	*0.12*	*0.11*	*0.11*	*0.10*	*0.09*
9	*0.36*	*0.34*	*0.32*	*0.30*	*0.28*	*0.26*	*0.24*	*0.23*	*0.21*	*0.20*	*0.19*	*0.18*	*0.17*	*0.16*	*0.15*	*0.14*	*0.13*	*0.12*	*0.11*	*0.11*	*0.10*	*0.09*	*0.09*	*0.08*

[1] The freshwater chronic water quality criteria for total ammonia where fish early life stages may be present were calculated using the following equation, which may also be used to calculate unlisted values:

Freshwater chronic water quality criterion for ammonia (fish early life stages present) =

[

$$\left[0.9405*\left(\frac{0.0278}{1+10^{7.688-pH}}+\frac{1.1994}{1+10^{pH-7.688}}\right)*MIN\left(\begin{matrix}6.920,\\ 7.547*10^{0.028*(20-T)}\end{matrix}\right)\right]$$

]

$$CCC = 0.8876 * \left(\frac{0.0278}{1 + 10^{7.688-pH}} + \frac{1.1994}{1 + 10^{pH-7.688}}\right) * \left(2.126 * 10^{0.028*\left(20-MAX(T,7)\right)}\right)$$

[Where MIN indicates the lesser of the two values separated by a comma.**]** *Where MAX indicates the greater of the two values separated by a comma.*

(6) Table 2. Chronic Ammonia Criteria for Waters Where Freshwater Fish Early Life Stages Are Present and Freshwater mussels are absent (milligrams of nitrogen per liter). [1] **[**

Temperature(℃)																	
pH	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
6.5	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.0	6.6	6.2	5.8	5.4	5.1	4.8	4.5	4.2
6.6	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	6.9	6.5	6.1	5.7	5.3	5.0	4.7	4.4	4.1
6.7	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	6.8	6.4	6.0	5.6	5.2	4.9	4.6	4.3	4.1
6.8	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.6	6.2	5.8	5.5	5.1	4.8	4.5	4.2	4.0
6.9	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.4	6.0	5.7	5.3	5.0	4.7	4.4	4.1	3.8

Temperature(℃)																	
7	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.2	5.8	5.5	5.1	4.8	4.5	4.2	4.0	3.7
7.1	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	5.9	5.6	5.2	4.9	4.6	4.3	4.0	3.8	3.6
7.2	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.6	5.3	5.0	4.7	4.4	4.1	3.8	3.6	3.4
7.3	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.3	5.0	4.7	4.4	4.1	3.8	3.6	3.4	3.2
7.4	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	4.9	4.6	4.3	4.1	3.8	3.6	3.4	3.1	2.9
7.5	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.5	4.3	4.0	3.7	3.5	3.3	3.1	2.9	2.7
7.6	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.1	3.9	3.6	3.4	3.2	3.0	2.8	2.6	2.5
7.7	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.7	3.5	3.2	3.0	2.9	2.7	2.5	2.3	2.2
7.8	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.3	3.1	2.9	2.7	2.5	2.4	2.2	2.1	1.9
7.9	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	2.8	2.7	2.5	2.3	2.2	2.1	1.9	1.8	1.7
8	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.5	2.3	2.2	2.0	1.9	1.8	1.7	1.6	1.5
8.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.0	1.8	1.7	1.6	1.5	1.4	1.3	1.2
8.2	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.7	1.5	1.5	1.4	1.3	1.2	1.1	1.1
8.3	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.4	1.3	1.2	1.1	1.1	1.0	0.9	0.9
8.4	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.2	1.1	1.1	1.0	0.9	0.9	0.8	0.8	0.7
8.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.9	0.9	0.8	0.8	0.7	0.7	0.6	0.6
8.6	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.8	0.8	0.7	0.7	0.6	0.6	0.6	0.5	0.5
8.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.6	0.6	0.5	0.5	0.5	0.5	0.4	0.4
8.8	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.5	0.5	0.5	0.4	0.4	0.4	0.4	0.3	0.3
8.9	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.3
9	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2

	Temperature (℃)																								
pH	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*	*17*	*18*	*19*	*20*	*21*	*22*	*23*	*24*	*25*	*26*	*27*	*28*	*29*	*30*
6.5	*7.34*	*7.34*	*7.34*	*7.34*	*7.34*	*7.34*	*7.34*	*7.34*	*7.34*	*7.34*	*7.34*	*7.34*	*7.34*	*7.34*	*7.34*	*7.04*	*6.60*	*6.19*	*5.80*	*5.44*	*5.10*	*4.78*	*4.48*	*4.20*
6.6	*7.23*	*7.23*	*7.23*	*7.23*	*7.23*	*7.23*	*7.23*	*7.23*	*7.23*	*7.23*	*7.23*	*7.23*	*7.23*	*7.23*	*7.23*	*6.93*	*6.50*	*6.09*	*5.71*	*5.36*	*5.02*	*4.71*	*4.41*	*4.14*
6.7	*7.10*	*7.10*	*7.10*	*7.10*	*7.10*	*7.10*	*7.10*	*7.10*	*7.10*	*7.10*	*7.10*	*7.10*	*7.10*	*7.10*	*7.10*	*6.80*	*6.38*	*5.98*	*5.61*	*5.26*	*4.93*	*4.62*	*4.33*	*4.06*
6.8	*6.93*	*6.93*	*6.93*	*6.93*	*6.93*	*6.93*	*6.93*	*6.93*	*6.93*	*6.93*	*6.93*	*6.93*	*6.93*	*6.93*	*6.93*	*6.65*	*6.23*	*5.84*	*5.48*	*5.14*	*4.81*	*4.51*	*4.23*	*3.97*
6.9	*6.74*	*6.74*	*6.74*	*6.74*	*6.74*	*6.74*	*6.74*	*6.74*	*6.74*	*6.74*	*6.74*	*6.74*	*6.74*	*6.74*	*6.74*	*6.46*	*6.06*	*5.68*	*5.32*	*4.99*	*4.68*	*4.39*	*4.11*	*3.86*
7	*6.51*	*6.51*	*6.51*	*6.51*	*6.51*	*6.51*	*6.51*	*6.51*	*6.51*	*6.51*	*6.51*	*6.51*	*6.51*	*6.51*	*6.51*	*6.24*	*5.85*	*5.48*	*5.14*	*4.82*	*4.52*	*4.24*	*3.97*	*3.73*
7.1	*6.24*	*6.24*	*6.24*	*6.24*	*6.24*	*6.24*	*6.24*	*6.24*	*6.24*	*6.24*	*6.24*	*6.24*	*6.24*	*6.24*	*6.24*	*5.98*	*5.61*	*5.26*	*4.93*	*4.62*	*4.33*	*4.06*	*3.81*	*3.57*
7.2	*5.94*	*5.94*	*5.94*	*5.94*	*5.94*	*5.94*	*5.94*	*5.94*	*5.94*	*5.94*	*5.94*	*5.94*	*5.94*	*5.94*	*5.94*	*5.69*	*5.33*	*5.00*	*4.69*	*4.40*	*4.12*	*3.86*	*3.62*	*3.40*
7.3	*5.59*	*5.59*	*5.59*	*5.59*	*5.59*	*5.59*	*5.59*	*5.59*	*5.59*	*5.59*	*5.59*	*5.59*	*5.59*	*5.59*	*5.59*	*5.36*	*5.03*	*4.71*	*4.42*	*4.14*	*3.88*	*3.64*	*3.41*	*3.20*
7.4	*5.21*	*5.21*	*5.21*	*5.21*	*5.21*	*5.21*	*5.21*	*5.21*	*5.21*	*5.21*	*5.21*	*5.21*	*5.21*	*5.21*	*5.21*	*5.00*	*4.69*	*4.39*	*4.12*	*3.86*	*3.62*	*3.39*	*3.18*	*2.98*

7.5	4.81	4.81	4.81	4.81	4.81	4.81	4.81	4.81	4.81	4.81	4.81	4.81	4.81	4.81	4.81	4.61	4.32	4.05	3.80	3.56	3.34	3.13	2.93	2.75
7.6	4.38	4.38	4.38	4.38	4.38	4.38	4.38	4.38	4.38	4.38	4.38	4.38	4.38	4.38	4.38	4.20	3.94	3.69	3.46	3.24	3.04	2.85	2.67	2.51
7.7	3.94	3.94	3.94	3.94	3.94	3.94	3.94	3.94	3.94	3.94	3.94	3.94	3.94	3.94	3.94	3.94	3.78	3.54	3.32	3.11	2.92	2.74	2.57	2.41	2.26
7.8	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.36	3.15	2.95	2.77	2.60	2.43	2.28	2.14	2.01
7.9	3.08	3.08	3.08	3.08	3.08	3.08	3.08	3.08	3.08	3.08	3.08	3.08	3.08	3.08	3.08	3.08	2.95	2.77	2.60	2.43	2.28	2.14	2.01	1.88	1.76
8	2.68	2.68	2.68	2.68	2.68	2.68	2.68	2.68	2.68	2.68	2.68	2.68	2.68	2.68	2.68	2.68	2.57	2.41	2.26	2.12	1.99	1.86	1.75	1.64	1.53
8.1	2.31	2.31	2.31	2.31	2.31	2.31	2.31	2.31	2.31	2.31	2.31	2.31	2.31	2.31	2.31	2.31	2.21	2.08	1.95	1.82	1.71	1.60	1.50	1.41	1.32
8.2	1.97	1.97	1.97	1.97	1.97	1.97	1.97	1.97	1.97	1.97	1.97	1.97	1.97	1.97	1.97	1.97	1.89	1.77	1.66	1.56	1.46	1.37	1.29	1.21	1.13
8.3	1.68	1.68	1.68	1.68	1.68	1.68	1.68	1.68	1.68	1.68	1.68	1.68	1.68	1.68	1.68	1.68	1.61	1.51	1.41	1.33	1.24	1.17	1.09	1.02	0.96
8.4	1.42	1.42	1.42	1.42	1.42	1.42	1.42	1.42	1.42	1.42	1.42	1.42	1.42	1.42	1.42	1.42	1.36	1.28	1.20	1.12	1.05	0.99	0.92	0.87	0.81
8.5	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.15	1.08	1.01	0.95	0.89	0.83	0.78	0.73	0.69
8.6	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	0.97	0.91	0.85	0.80	0.75	0.70	0.66	0.62	0.58
8.7	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.82	0.77	0.72	0.68	0.63	0.60	0.56	0.52	0.49
8.8	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.70	0.65	0.61	0.58	0.54	0.51	0.47	0.44	0.42
8.9	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.60	0.56	0.52	0.49	0.46	0.43	0.40	0.38	0.36
9	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.51	0.48	0.45	0.42	0.40	0.37	0.35	0.33	0.31	

[1]The freshwater chronic water quality criteria for total ammonia where fish early life stages are present but freshwater mussels are absent were calculated using the following equation, which may also be used to calculate unlisted values:

Freshwater chronic water quality criterion for ammonia (fish early life stages present and freshwater mussels absent) =CCC=

$$\left[0.9405*\left(\frac{0.0278}{1+10^{7.688-pH}}+\frac{1.1994}{1+10^{pH-7.688}}\right)*MIN\left(\begin{matrix}6.920,\\ 7.547*10^{0.028*(20-T)}\end{matrix}\right)\right]$$

Where MIN indicates the lesser of the two values separated by a comma.

(7) Table 3. Chronic Ammonia Criteria for Waters Where Freshwater Fish Early Life Stages Are Absent and Freshwater Mussels Are Absent (milligrams of nitrogen per liter). [1]

Temperature(℃)																								
6.5	18.5	17.3	16.2	15.2	14.3	13.4	12.6	11.8	11.0	10.3	9.7	9.1	8.5	8.0	7.5	7.0	6.6	6.2	5.8	5.4	5.1	4.8	4.5	4.2
6.6	18.2	17.1	16.0	15.0	14.1	13.2	12.4	11.6	10.9	10.2	9.6	9.0	8.4	7.9	7.4	6.9	6.5	6.1	5.7	5.3	5.0	4.7	4.4	4.1
6.7	17.8	16.7	15.7	14.7	13.8	12.9	12.1	11.4	10.7	10.0	9.4	8.8	8.2	7.7	7.2	6.8	6.4	6.0	5.6	5.2	4.9	4.6	4.3	4.1
6.8	17.4	16.3	15.3	14.4	13.5	12.6	11.8	11.1	10.4	9.8	9.1	8.6	8.0	7.5	7.1	6.6	6.2	5.8	5.5	5.1	4.8	4.5	4.2	4.0

Temperature(℃)																								
6.9	16.9	15.9	14.9	13.9	13.1	12.3	11.5	10.8	10.1	9.5	8.9	8.3	7.8	7.3	6.9	6.4	6.0	5.7	5.3	5.0	4.7	4.4	4.1	3.8
7	16.3	15.3	14.4	13.5	12.6	11.8	11.1	10.4	9.8	9.1	8.6	8.0	7.5	7.1	6.6	6.2	5.8	5.5	5.1	4.8	4.5	4.2	4.0	3.7
7.1	15.6	14.7	13.8	12.9	12.1	11.3	10.6	10.0	9.3	8.8	8.2	7.7	7.2	6.8	6.3	5.9	5.6	5.2	4.9	4.6	4.3	4.0	3.8	3.6
7.2	14.9	13.9	13.1	12.2	11.5	10.8	10.1	9.5	8.9	8.3	7.8	7.3	6.9	6.4	6.0	5.6	5.3	5.0	4.7	4.4	4.1	3.8	3.6	3.4
7.3	14.0	13.1	12.3	11.5	10.8	10.1	9.5	8.9	8.3	7.8	7.3	6.9	6.4	6.0	5.7	5.3	5.0	4.7	4.4	4.1	3.8	3.6	3.4	3.2
7.4	13.0	12.2	11.4	10.7	10.0	9.4	8.8	8.3	7.8	7.3	6.8	6.4	6.0	5.6	5.3	4.9	4.6	4.3	4.1	3.8	3.6	3.4	3.1	2.9
7.5	11.9	11.2	10.5	9.8	9.2	8.6	8.1	7.6	7.1	6.7	6.3	5.9	5.5	5.2	4.8	4.5	4.3	4.0	3.7	3.5	3.3	3.1	2.9	2.7
7.6	10.8	10.2	9.5	8.9	8.4	7.8	7.4	6.9	6.5	6.1	5.7	5.3	5.0	4.7	4.4	4.1	3.9	3.6	3.4	3.2	3.0	2.8	2.6	2.5
7.7	9.7	9.1	8.5	8.0	7.5	7.0	6.6	6.2	5.8	5.4	5.1	4.8	4.5	4.2	3.9	3.7	3.5	3.2	3.0	2.9	2.7	2.5	2.3	2.2
7.8	8.6	8.0	7.5	7.1	6.6	6.2	5.8	5.5	5.1	4.8	4.5	4.2	4.0	3.7	3.5	3.3	3.1	2.9	2.7	2.5	2.4	2.2	2.1	1.9
7.9	7.5	7.0	6.6	6.2	5.8	5.4	5.1	4.8	4.5	4.2	3.9	3.7	3.5	3.2	3.0	2.8	2.7	2.5	2.3	2.2	2.1	1.9	1.8	1.7
8	6.5	6.0	5.7	5.3	5.0	4.7	4.4	4.1	3.9	3.6	3.4	3.2	3.0	2.8	2.6	2.5	2.3	2.2	2.0	1.9	1.8	1.7	1.6	1.5
8.1	5.5	5.2	4.8	4.5	4.2	4.0	3.7	3.5	3.3	3.1	2.9	2.7	2.5	2.4	2.2	2.1	2.0	1.8	1.7	1.6	1.5	1.4	1.3	1.2
8.2	4.6	4.3	4.1	3.8	3.6	3.4	3.1	2.9	2.8	2.6	2.4	2.3	2.1	2.0	1.9	1.8	1.7	1.5	1.5	1.4	1.3	1.2	1.1	1.1
8.3	3.9	3.6	3.4	3.2	3.0	2.8	2.6	2.5	2.3	2.2	2.0	1.9	1.8	1.7	1.6	1.5	1.4	1.3	1.2	1.1	1.1	1.0	0.9	0.9
8.4	3.2	3.0	2.8	2.6	2.5	2.3	2.2	2.0	1.9	1.8	1.7	1.6	1.5	1.4	1.3	1.2	1.1	1.1	1.0	0.9	0.9	0.8	0.8	0.7
8.5	2.6	2.5	2.3	2.2	2.0	1.9	1.8	1.7	1.6	1.5	1.4	1.3	1.2	1.1	1.1	1.0	0.9	0.9	0.8	0.8	0.7	0.7	0.6	0.6
8.6	2.1	2.0	1.9	1.8	1.7	1.6	1.5	1.4	1.3	1.2	1.1	1.1	1.0	0.9	0.9	0.8	0.8	0.7	0.7	0.6	0.6	0.6	0.5	0.5
8.7	1.7	1.6	1.5	1.4	1.3	1.3	1.2	1.1	1.0	1.0	0.9	0.9	0.8	0.8	0.7	0.7	0.6	0.6	0.5	0.5	0.5	0.5	0.4	0.4
8.8	1.4	1.3	1.2	1.2	1.1	1.0	1.0	0.9	0.8	0.8	0.7	0.7	0.7	0.6	0.6	0.5	0.5	0.5	0.4	0.4	0.4	0.4	0.3	0.3
8.9	1.1	1.1	1.0	0.9	0.9	0.8	0.8	0.7	0.7	0.6	0.6	0.6	0.5	0.5	0.5	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.3
9	0.9	0.9	0.8	0.8	0.7	0.7	0.6	0.6	0.5	0.5	0.5	0.5	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2

	Temperature (℃)																							
pH	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*	*17*	*18*	*19*	*20*	*21*	*22*	*23*	*24*	*25*	*26*	*27*	*28*	*29*	*30*
6.5	*18.5*	*17.4*	*16.3*	*15.3*	*14.3*	*13.4*	*12.6*	*11.8*	*11.1*	*10.4*	*9.72*	*9.11*	*8.54*	*8.01*	*7.51*	*7.04*	*6.60*	*6.19*	*5.80*	*5.44*	*5.10*	*4.78*	*4.48*	*4.20*

6.6	18.2	17.1	16.0	15.0	14.1	13.2	12.4	11.6	10.9	10.2	9.57	8.97	8.41	7.89	7.39	6.93	6.50	6.09	5.71	5.36	5.02	4.71	4.41	4.14
6.7	17.9	16.8	15.7	14.7	13.8	13.0	12.2	11.4	10.7	10.0	9.39	8.80	8.25	7.74	7.25	6.80	6.38	5.98	5.61	5.26	4.93	4.62	4.33	4.06
6.8	17.5	16.4	15.4	14.4	13.5	12.7	11.9	11.1	10.4	9.78	9.17	8.60	8.06	7.56	7.09	6.65	6.23	5.84	5.48	5.14	4.81	4.51	4.23	3.97
6.9	17.0	15.9	14.9	14.0	13.1	12.3	11.5	10.8	10.1	9.51	8.92	8.36	7.84	7.35	6.89	6.46	6.06	5.68	5.32	4.99	4.68	4.39	4.11	3.86
7	16.4	15.4	14.4	13.5	12.7	11.9	11.1	10.5	9.80	9.19	8.61	8.07	7.57	7.10	6.65	6.24	5.85	5.48	5.14	4.82	4.52	4.24	3.97	3.73
7.1	15.7	14.8	13.8	13.0	12.2	11.4	10.7	10.0	9.40	8.81	8.26	7.74	7.26	6.81	6.38	5.98	5.61	5.26	4.93	4.62	4.33	4.06	3.81	3.57
7.2	15.0	14.0	13.2	12.3	11.6	10.8	10.2	9.53	8.94	8.38	7.85	7.36	6.90	6.47	6.07	5.69	5.33	5.00	4.69	4.40	4.12	3.86	3.62	3.40
7.3	14.1	13.2	12.4	11.6	10.9	10.2	9.58	8.98	8.42	7.89	7.40	6.94	6.50	6.10	5.72	5.36	5.03	4.71	4.42	4.14	3.88	3.64	3.41	3.20
7.4	13.1	12.3	11.6	10.8	10.2	9.52	8.93	8.37	7.85	7.36	6.90	6.47	6.06	5.69	5.33	5.00	4.69	4.39	4.12	3.86	3.62	3.39	3.18	2.98
7.5	12.1	11.4	10.7	9.99	9.36	8.78	8.23	7.72	7.24	6.78	6.36	5.96	5.59	5.24	4.91	4.61	4.32	4.05	3.80	3.56	3.34	3.13	2.93	2.75
7.6	11.0	10.4	9.70	9.10	8.53	8.00	7.50	7.03	6.59	6.18	5.79	5.43	5.09	4.78	4.48	4.20	3.94	3.69	3.46	3.24	3.04	2.85	2.67	2.51
7.7	9.94	9.32	8.73	8.19	7.68	7.20	6.75	6.33	5.93	5.56	5.21	4.89	4.58	4.30	4.03	3.78	3.54	3.32	3.11	2.92	2.74	2.57	2.41	2.26
7.8	8.84	8.29	7.77	7.28	6.83	6.40	6.00	5.63	5.28	4.95	4.64	4.35	4.08	3.82	3.58	3.36	3.15	2.95	2.77	2.60	2.43	2.28	2.14	2.01
7.9	7.77	7.28	6.83	6.40	6.00	5.63	5.28	4.95	4.64	4.35	4.08	3.82	3.58	3.36	3.15	2.95	2.77	2.60	2.43	2.28	2.14	2.01	1.88	1.76
8	6.76	6.34	5.94	5.57	5.22	4.90	4.59	4.30	4.03	3.78	3.55	3.33	3.12	2.92	2.74	2.57	2.41	2.26	2.12	1.99	1.86	1.75	1.64	1.53
8.1	5.82	5.46	5.12	4.80	4.50	4.22	3.96	3.71	3.48	3.26	3.06	2.87	2.69	2.52	2.36	2.21	2.08	1.95	1.82	1.71	1.60	1.50	1.41	1.32
8.2	4.98	4.67	4.38	4.10	3.85	3.61	3.38	3.17	2.97	2.79	2.61	2.45	2.30	2.15	2.02	1.89	1.77	1.66	1.56	1.46	1.37	1.29	1.21	1.13
8.3	4.23	3.97	3.72	3.49	3.27	3.07	2.87	2.69	2.53	2.37	2.22	2.08	1.95	1.83	1.72	1.61	1.51	1.41	1.33	1.24	1.17	1.09	1.02	0.96
8.4	3.58	3.36	3.15	2.95	2.77	2.59	2.43	2.28	2.14	2.00	1.88	1.76	1.65	1.55	1.45	1.36	1.28	1.20	1.12	1.05	0.99	0.92	0.87	0.81
8.5	3.02	2.84	2.66	2.49	2.34	2.19	2.05	1.93	1.81	1.69	1.59	1.49	1.40	1.31	1.23	1.15	1.08	1.01	0.95	0.89	0.83	0.78	0.73	0.69
8.6	2.55	2.39	2.24	2.10	1.97	1.85	1.73	1.63	1.52	1.43	1.34	1.26	1.18	1.10	1.04	0.97	0.91	0.85	0.80	0.75	0.70	0.66	0.62	0.58
8.7	2.16	2.03	1.90	1.78	1.67	1.57	1.47	1.38	1.29	1.21	1.13	1.06	1.00	0.93	0.88	0.82	0.77	0.72	0.68	0.63	0.60	0.56	0.52	0.49
8.8	1.84	1.72	1.61	1.51	1.42	1.33	1.25	1.17	1.10	1.03	0.96	0.90	0.85	0.79	0.74	0.70	0.65	0.61	0.58	0.54	0.51	0.47	0.44	0.42
8.9	1.57	1.47	1.38	1.29	1.21	1.14	1.07	1.00	0.94	0.88	0.82	0.77	0.72	0.68	0.64	0.60	0.56	0.52	0.49	0.46	0.43	0.40	0.38	0.36
9	1.35	1.27	1.19	1.11	1.04	0.98	0.92	0.86	0.81	0.76	0.71	0.66	0.62	0.58	0.55	0.51	0.48	0.45	0.42	0.40	0.37	0.35	0.33	0.31

[1] The freshwater chronic water quality criteria for total ammonia where fish early life stages are present but freshwater mussels are absent were calculated using the following equation, which may also be used to calculate unlisted values:

Freshwater chronic water quality criterion for ammonia (fish early life stages absent and freshwater mussels absent)=CCC=

$$\left(0.9405*\left(\frac{0.0278}{1+10^{7.688-pH}}+\frac{1.1994}{1+10^{pH-7.688}}\right)*\left(7.547*10^{0.028*(20-MAX(T,7))}\right)\right)$$

Where MAX indicates the greater of the two values separated by a comma.

J.—K. (text unchanged.)