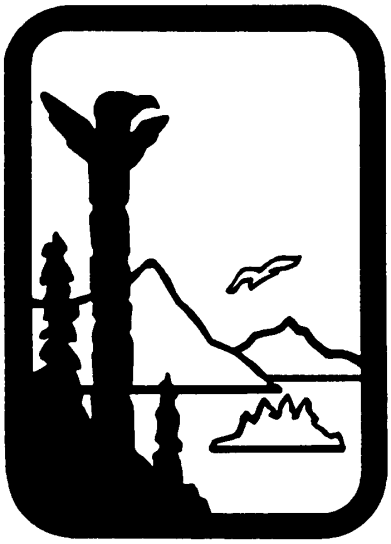
STATE OF ALASKA

DEPARTMENT OF ENVIRONMENTAL CONSERVATION



ALASKA WATER QUALITY CRITERIA MANUAL FOR TOXIC AND OTHER DELETERIOUS ORGANIC AND INORGANIC SUBSTANCES

DRAFT AMENDMENTS

Public Comment Version - August 15, 2025

Michael Dunleavy
Governor

Randy Bates
Commissioner

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MANUAL ORGANIZATION

This manual contains: (1) acronyms and abbreviations; (2) numeric water quality criteria for toxics and other deleterious substances; (3) seven appendixes that include calculations for dissolved metals and tables for ammonium criteria; and (4) reference materials.

ACRONYMS AND ABBREVIATIONS

AAC – Alaska Administrative Code
Aquatic Life (F) – Aquatic Life, Freshwater
Aquatic Life (S) – Aquatic Life, Salt Water
avg – Average
CMC – Criterion Maximum Concentration
CCC – Criterion Chronic Concentration
CF – Conversion Factor
CWA – Federal Clean Water Act
DBP – Disinfection Byproduct
EPA – Environmental Protection Agency (also U.S. EPA)
FWPCA – Federal Water Pollution Control Act
HHC – Human Health Criteria
INORG – Inorganic Contaminant
L or l – Liter
max – Maximum
µg – micrograms
NPDES – National Pollutant Discharge Elimination System
OOC – Other Organic Contaminant
PCB – Polychlorinated biphenyl
pCi – Picocuries
PEST - Pesticide
ppb – Parts Per Billion
RAD – Radioactive Contaminant
SMAV – Species Mean Acute Value
SVOC – Semi-volatile Organic Contaminant
TMDL – Total Maximum Daily Load
VOC – Volatile Organic Contaminant
WAD – Weak Acid Dissociable
WQS – Water Quality Standard

NUMERIC TOXICS CRITERIA

The "Water Quality Criteria for Toxics and Other Deleterious Substances" list below contains the numeric water quality criteria adopted into the WQS in 18 AAC 70.020(b). These numeric criteria were taken from the EPA criteria documents cited in the references column and Alaska Drinking Water Regulations in 18 AAC 80. Although these EPA criteria documents are no longer adopted directly into state regulation, they contain valuable information on the science used to create the criteria limits and may affect how the criteria are applied or modified.

The types of numeric criteria in the table below apply to the following sections of the water quality standards in 18 AAC 70.

Types of numeric criteria:

1. **Drinking water:** Water quality standards for radioactivity in 18 AAC 70.020(b)(7) and (19), and toxic and other deleterious organic and inorganic substances for fresh water uses for drinking, culinary, and food processing, and for contact recreation in 18 AAC 70.020(b)(11) must be based on the drinking water criteria in the table below.

2. **Stockwater and Irrigation:** Water quality standards for toxic and other deleterious substances for fresh water use of water supply for agriculture in 18 AAC 70.020(b)(11) must be based on the stockwater criteria and irrigation criteria in the table below.

3. **Aquatic life criteria for fresh water**: Water quality standards for toxic and other deleterious substances for fresh water uses of aquaculture and growth and propagation of fish, shellfish, other aquatic life, and wildlife in 18 AAC 70.020(b)(11) must be based on aquatic life criteria for fresh water in the table below.

4. **Aquatic life criteria for marine water:** Water quality standards for toxic and other deleterious substances for marine water uses of aquaculture, seafood processing, growth and propagation of fish, shellfish, other aquatic life and wildlife, and harvesting for consumption of raw mollusks or other raw aquatic life in 18 AAC 70.020(b)(23) must be based on aquatic life criteria for marine water in the table below.

5. **Human health consumption:** Water quality standards for toxic and other deleterious substances for fresh water uses of drinking, culinary, and food processing, and growth and propagation of fish, shellfish, other aquatic life, and wildlife in 18 AAC 70.020(b)(11); and marine water uses of aquaculture, growth and propagation of fish, shellfish, other aquatic life and wildlife, and harvesting for consumption of raw mollusks or other raw aquatic life in 18 AAC 70.020(b)(23) must be based on human health criteria for consumption in the table below.

WATER QUALITY CRITERIA FOR TOXICS AND OTHER DELETERIOUS SUBSTANCES (µg/l unless shown otherwise)

Pollutant CAS Number	Type of Pollutant	Drinking Water [1]	Stock-water [2]	Irrigation Water [3]	Aquatic Life for Fresh Water		Aquatic Life for Marine Water		Human Health for Consumption of:		References [4]
					Acute (CMC)	Chronic (CCC)	Acute (CMC)	Chronic (CCC)	Water + Aquatic Organisms	Aquatic Organisms Only	
Acenapthene 83329	SVOC	—	—	—	—	—	—	—	**1,200** [5]	**2,700** [5]	**Human Health:** 65 FR 31682 EPA 440-5-80-015 EPA 822-Z-99-001
Acrolein 107028	VOC	—	—	—	—	—	—	—	**320**	**780**	**Human Health:** 57 FR 60848 65 FR 31682 EPA 822-Z-99-001
Alachlor 15972608	PEST	**2**	—	—	—	—	—	—	—	—	**Drinking Water:** 18 AAC 80.300(b)
Aldicarb 116063	PEST	**3**	—	—	—	—	—	—	—	—	**Drinking Water:** 18 AAC 80.300(b) 56 FR 30266 63 FR 10273
Aldicarb Sulfone 1646884	PEST	**2**	—	—	—	—	—	—	—	—	**Drinking Water:** 18 AAC 80.300(b) 56 FR 30266 63 FR 10273
Aldicarb Sulfoxide 1646873	PEST	**4**	—	—	—	—	—	—	—	—	**Drinking Water:** 18 AAC 80.300(b) 56 FR 30266 63 FR 10273
Aldrin 309002	PEST SVOC	—	—	—	**3.0** (24-hr max) [6, 7]	—	**1.3** (24-hr max) [6, 7]	—	—	—	**Aquatic Life:** 57 FR 60848 65 FR 31682 67 FR 79091 EPA 440-5-80-019 EPA 822-Z-99-001 EPA NRWQC 2006
Alkalinity [8]	INORG	—	—	—	—	**20,000** (minimum) as $CaCO_3$ except where natural alkalinity is lower.	—	—	—	—	**Aquatic Life (F):** 67 FR 79091 EPA Red Book EPA 440-9-76-023 EPA 822-Z-99-001 EPA NRWQC 2006

WATER QUALITY CRITERIA FOR TOXICS AND OTHER DELETERIOUS SUBSTANCES (µg/l unless shown otherwise)

Pollutant CAS Number	Type of Pollutant	Drinking Water [1]	Stock-water [2]	Irrigation Water [3]	Aquatic Life for Fresh Water		Aquatic Life for Marine Water		Human Health for Consumption of:		References [4]
					Acute (CMC)	Chronic (CCC)	Acute (CMC)	Chronic (CCC)	Water + Aquatic Organisms	Aquatic Organisms Only	
alpha-Endosulfan 959988	PEST SVOC	—	—	—	**0.22** (24-hr max) [6, 7, 9]	**0.056** (24-hr avg) [7, 9, 10]	**0.034** (24-hr max) [6, 7, 9]	**0.0087** (24-hr avg) [7, 9, 10]	**110** [5]	**240** [5]	**Aquatic Life:** 57 FR 60848 65 FR 31682 67 FR 79091 EPA 440-5-80-046 EPA 822-Z-99-001 EPA NRWQC 2006 **Human Health:** 65 FR 31682 EPA 440-5-80-046 EPA 822-Z-99-001
Aluminum 7429905	INORG	—	—	**5,000** *total recoverable*	**750** (1-hr avg) [11, 20, 31] *total recoverable*	**87** (4-day avg) [12, 13, 14, 20, 31] *total recoverable*	—	—	—	—	**Irrigation:** EPA Blue Book **Aquatic Life (F):** 67 FR 79091 EPA 440-5-86-008 EPA 822-Z-99-001 EPA NRWQC 2006
Ammonia (total ammonia nitrogen in mg N/l) 7664417	INORG	—	—	—	Criteria are pH dependent **See Appendix C** (1-hr avg) [11] *total ammonia*	Criteria are pH dependent **See Appendices D and E** (30-day avg) [15] *total ammonia*	Criteria are pH and temperature dependent **See Appendix F** (1-hr avg) [11, 16] *total ammonia*	Criteria are pH and temperature dependent **See Appendix G** (4-day avg) [12, 16] *total ammonia*	—	—	**Aquatic Life (F):** EPA 822-R-99-014 EPA 822-Z-99-001 EPA NRWQC 2006 **Aquatic Life (S):** EPA 440-5-88-004 EPA 822-Z-99-001 EPA NRWQC 2006
Ammonia (unionized ammonia in mg NH_3/l) 7664417	INORG	—	—	—	—	—	**0.233** (1-hr avg) [11, 16] *unionized ammonia*	**0.035** (4-day avg) [12, 16] *unionized ammonia*	—	—	**Aquatic Life (S):** EPA 440-5-88-004 EPA NRWQC 2006
Anthracene 120127	SVOC	—	—	—	—	—	—	—	**9,600** [5]	**110,000** [5]	**Human Health:** 57 FR 60848 65 FR 31682 EPA 440-5-80-069 EPA 822-Z-99-001

WATER QUALITY CRITERIA FOR TOXICS AND OTHER DELETERIOUS SUBSTANCES (µg/l unless shown otherwise)

Pollutant CAS Number	Type of Pollutant	Drinking Water [1]	Stock-water [2]	Irrigation Water [3]	Aquatic Life for Fresh Water		Aquatic Life for Marine Water		Human Health for Consumption of:		References [4]
					Acute (CMC)	Chronic (CCC)	Acute (CMC)	Chronic (CCC)	Water + Aquatic Organisms	Aquatic Organisms Only	
Antimony 7440360	INORG	**6**	—	—	—	—	—	—	**14** [5]	**4,300** [5]	**Drinking Water:** 18 AAC 80.300(b) **Human Health:** 57 FR 60848 65 FR 31682 EPA 440-5-80-020 EPA 822-Z-99-001
Arsenic 7440382	INORG	**10** [17]	**50**	**100**	**340** (1-hr avg) [11] *dissolved* [18, 19, 20]	**150** (4-day avg) [12] *dissolved* [19, 20, 21]	**69** **See Appendix B** (1-hr avg) [11] *dissolved* [19, 22, 41]	**36** **See Appendix B** (4-day avg) [12] *dissolved* [19, 23, 41]	—	—	**Drinking Water:** 18 AAC 80.300(b) 18 AAC 80.300(b)(4) 66 FR 6976 68 FR 14501 **Stockwater:** EPA Green Book **Irrigation:** EPA Blue Book **Aquatic Life:** 57 FR 60848 60 FR 22228 65 FR 31682 67 FR 79091 EPA 440-5-84-033 EPA 820-B-96-001 EPA 822-Z-99-001 EPA NRWQC 2006 **Human Health:** 63 FR 10140
Asbestos 1332214	INORG	**7** million fibers/ liter (for fibers longer than 10 µm)	—	—	—	—	—	—	—	—	**Drinking Water:** 57 FR 60848 18 AAC 80.300(b)
Atrazine 1912249	PEST	**3**	—	—	—	—	—	—	—	—	**Drinking Water:** 18 AAC 80.300(b)
Barium 7440393	INORG	**2,000**	—	—	—	—	—	—	—	—	**Drinking Water:** 18 AAC 80.300(b)

WATER QUALITY CRITERIA FOR TOXICS AND OTHER DELETERIOUS SUBSTANCES (µg/l unless shown otherwise)

Pollutant CAS Number	Type of Pollutant	Drinking Water [1]	Stock-water [2]	Irrigation Water [3]	Aquatic Life for Fresh Water		Aquatic Life for Marine Water		Human Health for Consumption of:		References [4]
					Acute (CMC)	Chronic (CCC)	Acute (CMC)	Chronic (CCC)	Water + Aquatic Organisms	Aquatic Organisms Only	
Benzene 71432	VOC	**5**	—	—	—	—	—	—	—	—	**Drinking Water:** 18 AAC 80.300(b)
Benzo(a)Pyrene 50328	SVOC	**0.2**	—	—	—	—	—	—	—	—	**Drinking Water:** 18 AAC 80.300(b)
Beryllium 7440417	INORG	**4**	—	**100**	—	—	—	—	—	—	**Drinking Water:** 18 AAC 80.300(b) **Irrigation:** EPA Blue Book
beta-Endosulfan [9] 33213659	PEST	—	—	—	**0.22** (24-hr max) [6, 7, 9]	**0.056** (24-hr avg) [7, 9, 10]	**0.034** (24-hr max) [6, 7, 9]	**0.0087** (24-hr avg) [7, 9, 10]	**110** [5]	**240** [5]	**Aquatic Life:** 57 FR 60848 65 FR 31682 67 FR 79091 EPA 440-5-80-046 EPA 822-Z-99-001 EPA NRWQC 2006 **Human Health:** 65 FR 31682 EPA 440-5-80-046 EPA 822-Z-99-001
Bis(2-chloro-isopropyl) Ether 39638329	SVOC	—	—	—	—	—	—	—	**1,400** [5]	**170,000** [5]	**Human Health:** 57 FR 60848 65 FR 31682 EPA 440-5-80-030 EPA 822-Z-99-001
Bis-chloromethyl Ether 542881	OOC	—	—	—	—	—	—	—	**0.00013** [5]	**0.00078** [5]	**Human Health:** EPA 440-5-80-030 EPA 822-Z-99-001
Boron 7440428	INORG	—	—	**750**	—	—	—	—	—	—	**Irrigation:** EPA Blue Book
Bromate 15541454	DBP	**10**	—	—	—	—	—	—	—	—	**Drinking Water:** 18 AAC 80.300(b)
Butylbenzyl Phthalate [24] 85687	SVOC	—	—	—	—	—	—	—	**3,000** [5]	**5,200** [5]	**Human Health:** 65 FR 31682 EPA 440-5-80-067 EPA 822-Z-99-001

WATER QUALITY CRITERIA FOR TOXICS AND OTHER DELETERIOUS SUBSTANCES (µg/l unless shown otherwise)

Pollutant CAS Number	Type of Pollutant	Drinking Water [1]	Stock-water [2]	Irrigation Water [3]	Aquatic Life for Fresh Water		Aquatic Life for Marine Water		Human Health for Consumption of:		References [4]
					Acute (CMC)	Chronic (CCC)	Acute (CMC)	Chronic (CCC)	Water + Aquatic Organisms	Aquatic Organisms Only	
Cadmium 7440439	INORG	**5**	**10**	**10**	**See Appendix A** (1-hr avg) [11] *dissolved* [20, 25, 41]	**See Appendix A** (4-day avg) [12] *dissolved* [20, 25, 41]	**40** **See Appendix B** (1-hr avg) [11] *dissolved* [26, 27, 41]	**8.8** **See Appendix B** (4-day avg) [12] *dissolved* [28, 41]	—	—	**Drinking Water:** 18 AAC 80.300(b) **Stockwater:** EPA Green Book **Irrigation:** EPA Blue Book **Aquatic Life:** 60 FR 22228 67 FR 79091 EPA 820-B-96-001 EPA 822-R-01-001 EPA NRWQC 2006
Carbofuran 1563662	PEST	**40**	—	—	—	—	—	—	—	—	**Drinking Water:** 18 AAC 80.300(b)
Carbon Tetrachloride 56235	VOC	**5**	—	—	—	—	—	—	—	—	**Drinking Water:** 18 AAC 80.300(b)
Chlordane 57749	PEST SVOC	**2**	—	—	**2.4** (24-hr max) [6, 7]	**0.0043** (24-hr avg) [7, 10, 29]	**0.09** (24-hr max) [6, 7]	**0.004** (24-hr avg) [7, 10, 29]	—	—	**Drinking Water:** 18 AAC 80.300(b) **Aquatic Life:** 57 FR 60848 65 FR 31682 67 FR 79091 EPA 440-5-80-027 EPA 822-Z-99-001 EPA NRWQC 2006
Chloride 16887006	INORG	—	—	—	**860,000** (1-hr avg) [11] Applies to dissolved chloride when associated with sodium. [30, 31]	**230,000** (4-day avg) [12] Applies to dissolved chloride when associated with sodium. [30, 31]	—	—	—	—	**Aquatic Life (F):** 67 FR 79091 EPA 440-5-88-001 EPA 822-Z-99-001 EPA NRWQC 2006

WATER QUALITY CRITERIA FOR TOXICS AND OTHER DELETERIOUS SUBSTANCES (µg/l unless shown otherwise)

Pollutant CAS Number	Type of Pollutant	Drinking Water [1]	Stock-water [2]	Irrigation Water [3]	Aquatic Life for Fresh Water		Aquatic Life for Marine Water		Human Health for Consumption of:		References [4]
					Acute (CMC)	Chronic (CCC)	Acute (CMC)	Chronic (CCC)	Water + Aquatic Organisms	Aquatic Organisms Only	
Chlorine (total residual) 7782505	INORG	—	—	—	**19** (1-hr avg) [11]	**11** (4-day avg) [12]	**13** (1-hr avg) [11]	**7.5** (4-day avg) [12]	—	—	**Aquatic Life:** 67 FR 79091 EPA 440-5-84-030 EPA 440-5-86-001 EPA 822-Z-99-001 EPA NRWQC 2006
Chlorite	DBP	**1,000**	—	—	—	—	—	—	—	—	**Drinking Water:** 18 AAC 80.300(b)
Chlorobenzene 108907	VOC	—	—	—	—	—	—	—	**680** [5]	**21,000** [5, 32]	**Human Health:** 57 FR 60848 65 FR 31682 67 FR 79091 EPA 440-5-80-028 EPA 822-Z-99-001
Chloro-naphthalene, 2- 91587	SVOC	—	—	—	—	—	—	—	**1,700** [5]	**4,300** [5]	**Human Health:** 65 FR 31682 EPA 440-5-80-031 EPA 822-Z-99-001
Chlorophenol, 2- 95578	SVOC	—	—	—	—	—	—	—	**120** [5]	**400** [5]	**Human Health:** 65 FR 31682 EPA 440-5-80-034 EPA 822-Z-99-001
Chloropyrifos 2921882	PEST	—	—	—	**0.083** (1-hr avg) [11, 31]	**0.041** (4-day avg) [12, 31]	**0.011** (1-hr avg) [11, 31]	**0.0056** (4-day avg) [12, 31]	—	—	**Aquatic Life:** 67 FR 79091 EPA 440-5-86-001 EPA 440-5-86-005 EPA 822-Z-99-001 EPA NRWQC 2006
Chromium (total) 7440473	INORG	**100** *total recoverable*	—	**100** *total recoverable*	—	—	—	—	—	—	**Drinking Water:** 18 AAC 80.300(b) **Irrigation:** EPA Blue Book
Chromium III 16065831	INORG	—	—	—	**See Appendix A** (1-hr avg) [11] *dissolved* [20, 25]	**See Appendix A** (4-day avg) [12] *dissolved* [20, 25]	—	—	—	—	**Aquatic Life (F):** 60 FR 22228 67 FR 79091 EPA 440-5-84-029 EPA 820-B-96-001 EPA 822-Z-99-001 EPA NRWQC 2006

WATER QUALITY CRITERIA FOR TOXICS AND OTHER DELETERIOUS SUBSTANCES (µg/l unless shown otherwise)

Pollutant CAS Number	Type of Pollutant	Drinking Water [1]	Stock-water [2]	Irrigation Water [3]	Aquatic Life for Fresh Water		Aquatic Life for Marine Water		Human Health for Consumption of:		References [4]
					Acute (CMC)	Chronic (CCC)	Acute (CMC)	Chronic (CCC)	Water + Aquatic Organisms	Aquatic Organisms Only	
Chromium VI 18540299	INORG	—	**50**	—	**16** **See Appendix A** (1-hr avg) [11] *dissolved* [20, 33]	**11** **See Appendix A** (4-day avg) [12] *dissolved* [20, 34]	**1,100** **See Appendix B** (1-hr avg) [11] *dissolved* [20, 35, 36, 41]	**50** **See Appendix B** (4-day avg) [12] *dissolved* [20, 37, 41]	—	—	**Stockwater:** EPA Green Book **Aquatic Life:** 57 FR 60848 60 FR 22228 65 FR 31682 67 FR 79091 EPA 440-5-84-029 EPA 820-B-96-001 EPA 822-Z-99-001 EPA NRWQC 2006
Cobalt 7440484	INORG	—	—	**50**	—	—	—	—	—	—	**Irrigation:** EPA Blue Book
Copper 7440508	INORG	—	—	**200**	**See Appendix A** (1-hr avg) [11] *dissolved* [20, 25, 38]	**See Appendix A** (4-day avg) [12] *dissolved* [20, 25, 38]	**4.8** **See Appendix B** (24-hr avg) [10] *dissolved* [38, 39]	**3.1** **See Appendix B** (4-day avg) [12] *dissolved* [38, 39]	**1,300**	—	**Irrigation:** EPA Blue Book **Aquatic Life:** 60 FR 22228 65 FR 31682 67 FR 79091 EPA 440-5-84-031 EPA 820-B-96-001 EPA 822-Z-99-001 EPA NRWQC 2006 **Human Health:** 65 FR 31682 67 FR 79091 EPA 822-Z-99-001 EPA NRWQC 2006

WATER QUALITY CRITERIA FOR TOXICS AND OTHER DELETERIOUS SUBSTANCES (µg/l unless shown otherwise)

Pollutant CAS Number	Type of Pollutant	Drinking Water [1]	Stock-water [2]	Irrigation Water [3]	Aquatic Life for Fresh Water		Aquatic Life for Marine Water		Human Health for Consumption of:		References [4]
					Acute (CMC)	Chronic (CCC)	Acute (CMC)	Chronic (CCC)	Water + Aquatic Organisms	Aquatic Organisms Only	
Cyanide (as free cyanide, as CN/l) 57125	INORG	**200**	—	—	**22** (1-hr avg) [11, 20, 40]	**5.2** (4-day avg) [12, 20, 40]	**1.0** (1-hr avg) [11, 40, 41]	**1.0** (4-day avg) [12, 40, 41]	**700** [5]	**220,000** [5, 32]	**Drinking Water:** 18 AAC 80.300(b) **Aquatic Life:** 57 FR 60848 65 FR 31682 67 FR 79091 EPA 440-5-84-028 EPA 820-B-96-001 EPA 822-Z-99-001 EPA NRWQC 2006 **Human Health:** 57 FR 60848 65 FR 31682 67 FR 79091 EPA 440-5-80-037 EPA 440-5-84-028 EPA 822-Z-99-001
Dalapon 75990	PEST	**200**	—	—	—	—	—	—	—	—	**Drinking Water:** 18 AAC 80.300(b)
DDT, 4,4'- 50293	PEST	—	—	—	**1.1** (24-hr max) [6, 7, 42]	**0.001** (24-hr avg) [7, 10,29, 42]	**0.13** (24-hr max) [6, 7, 42]	**0.001** (24-hr avg) [7, 10,29,42]	—	—	**Aquatic Life:** 57 FR 60848 65 FR 31682 67 FR 79091 EPA 440-5-80-038 EPA 822-Z-99-001 EPA NRWQC 2006
Demeton 8065483	PEST	—	—	—	—	**0.1**	—	**0.1**	—	—	**Aquatic Life:** 67 FR 79091 EPA Red Book EPA 440-9-76-023 EPA 822-Z-99-001 EPA NRWQC 2006
Diazinon 333415	PEST	—	—	—	**0.17**	**0.17**	**0.82**	**0.82**	—	—	**Aquatic Life:** 71 FR 9336 EPA NRWQC 2006
Dibromo-chloropropane 67708832	PEST	**0.2**	—	—	—	—	—	—	—	—	**Drinking Water:** 18 AAC 80.300(b)

WATER QUALITY CRITERIA FOR TOXICS AND OTHER DELETERIOUS SUBSTANCES (µg/l unless shown otherwise)

Pollutant CAS Number	Type of Pollutant	Drinking Water [1]	Stock-water [2]	Irrigation Water [3]	Aquatic Life for Fresh Water		Aquatic Life for Marine Water		Human Health for Consumption of:		References [4]
					Acute (CMC)	Chronic (CCC)	Acute (CMC)	Chronic (CCC)	Water + Aquatic Organisms	Aquatic Organisms Only	
Dichlorobenzene 1,2- 95501	VOC SVOC	**600**	—	—	—	—	—	—	**2,700** [5]	**17,000** [5]	**Drinking Water:** 18 AAC 80.300(b) **Human Health:** 57 FR 60848 65 FR 31682 67 FR 79091 EPA 440-5-80-039 EPA 822-Z-99-001
Dichlorobenzene 1,3- 541731	VOC SVOC	—	—	—	—	—	—	—	**400**	**2,600**	**Human Health:** 57 FR 60848 65 FR 31682 EPA 440-5-80-039 EPA 822-Z-99-001
Dichlorobenzene 1,4- 106467	VOC SVOC	**75**	—	—	—	—	—	—	**400**	**2,600**	**Drinking Water:** 18 AAC 80.300(b) **Human Health:** 57 FR 60848 65 FR 31682 67 FR 79091 EPA 440-5-80-039 EPA 822-Z-99-001
Dichloroethane 1,2- 107062	VOC	**5**	—	—	—	—	—	—	—	—	**Drinking Water:** 18 AAC 80.300(b)
Dichloroethylene 1,1- 75354	VOC	**7**	—	—	—	—	—	—	—	—	**Drinking Water:** 18 AAC 80.300(b)
Dichloroethylene cis-1,2- 156592	VOC	**70**	—	—	—	—	—	—	—	—	**Drinking Water:** 18 AAC 80.300(b)
Dichloroethylene trans-1,2- 156605	VOC	**100**	—	—	—	—	—	—	**700** [5]	**140,000** [5]	**Drinking Water:** 18 AAC 80.300(b) **Human Health:** 65 FR 31682 67 FR 79091 EPA 440-5-80-041 EPA 822-Z-99-001

WATER QUALITY CRITERIA FOR TOXICS AND OTHER DELETERIOUS SUBSTANCES (µg/l unless shown otherwise)

Pollutant CAS Number	Type of Pollutant	Drinking Water [1]	Stock-water [2]	Irrigation Water [3]	Aquatic Life for Fresh Water		Aquatic Life for Marine Water		Human Health for Consumption of:		References [4]
					Acute (CMC)	Chronic (CCC)	Acute (CMC)	Chronic (CCC)	Water + Aquatic Organisms	Aquatic Organisms Only	
Dichlorophenol 2,4- 120832	OOC		—	—	—	—	—	—	**93** [5]	**790** [5]	**Human Health:** 57 FR 60848 65 FR 31682 EPA 440-5-80-042 EPA 822-Z-99-001
Dichlorophenoxy 2,4-Acetic Acid (2,4-D) 94757	PEST	**70**	—	—	—	—	—	—	—	—	**Drinking Water:** 18 AAC 80.300(b)
Dichloropropane 1,2- 78875	VOC	**5**	—	—	—	—	—	—	—	—	**Drinking Water:** 18 AAC 80.300(b)
Dichloropropene 1,3- 542756	VOC	—	—	—	—	—	—	—	**10** [5]	**1,700** [5]	**Human Health:** 57 FR 60848 67 FR 79091 EPA 440-5-80-043 EPA 822-Z-99-001
Dieldrin [43] 60571	PEST	—	—	—	**0.24** (1-hr avg) [11, 20]	**0.056** (4-day avg) [12, 20, 44]	**0.71** (24-hr max) [6, 7]	**0.0019** (24-hr avg) [7, 10, 29]	—	—	**Aquatic Life:** 57 FR 60848 65 FR 31682 67 FR 79091 EPA 440-5-80-019 EPA 820-B-96-001 EPA 822-Z-99-001 EPA NRWQC 2006
Di(2-ethylhexyl) Adipate 103231	OOC	**400**	—	—	—	—	—	—	—	—	**Drinking Water:** 18 AAC 80.300(b)
Di(2-ethylhexyl) Phthalate 117817	SVOC OOC	**6**	—	—	—	—	—	—	—	—	**Drinking Water:** 18 AAC 80.300(b)
Diethyl Phthalate [24] 84662	SVOC	—	—	—	—	—	—	—	**23,000** [5]	**120,000** [5]	**Human Health:** 57 FR 60848 65 FR 31682 EPA 440-5-80-067 EPA 822-Z-99-001

WATER QUALITY CRITERIA FOR TOXICS AND OTHER DELETERIOUS SUBSTANCES (µg/l unless shown otherwise)

Pollutant CAS Number	Type of Pollutant	Drinking Water [1]	Stock-water [2]	Irrigation Water [3]	Aquatic Life for Fresh Water		Aquatic Life for Marine Water		Human Health for Consumption of:		References [4]
					Acute (CMC)	Chronic (CCC)	Acute (CMC)	Chronic (CCC)	Water + Aquatic Organisms	Aquatic Organisms Only	
Dimethylphenol 2,4- 105679	SVOC	—	—	—	—	—	—	—	**540** [5]	**2,300** [5]	**Human Health:** 65 FR 31682 EPA 440-5-80-044 EPA 822-Z-99-001
Dimethyl Phthalate [24] 131113	SVOC	—	—	—	—	—	—	—	**313,000**	**2,900,000**	**Human Health:** 57 FR 60848 65 FR 31682 EPA 440-5-80-067 EPA 822-Z-99-001
Di-n-butyl Phthalate [24] 84742	SVOC	—	—	—	—	—	—	—	**2,700** [5]	**12,000** [5]	**Human Health:** 57 FR 60848 65 FR 31682 EPA 440-5-80-067 EPA 822-Z-99-001
Dinitrophenol 2,4- 51285	SVOC	—	—	—	—	—	—	—	**70** [5]	**14,000** [5]	**Human Health:** 57 FR 60848 65 FR 31682 EPA 440-5-80-063 EPA 822-Z-99-001
Dinoseb 88857	PEST	**7**	—	—	—	—	—	—	—	—	**Drinking Water:** 18 AAC 80.300(b)
Dioxin (2,3,7,8-TCDD) 1746016	OOC	**0.00003**	—	—	—	—	—	—	—	—	**Drinking Water:** 18 AAC 80.300(b)
Diquat 2764729	PEST	**20**	—	—	—	—	—	—	—	—	**Drinking Water:** 18 AAC 80.300(b)
Endosulfan Sulfate 1031078	PEST SVOC	—	—	—	—	—	—	—	**110** [5]	**240** [5]	**Human Health:** 65 FR 31682 EPA 440-5-80-046 EPA 822-Z-99-001
Endothall 145733	PEST	**100**	—	—	—	—	—	—	—	—	**Drinking Water:** 18 AAC 80.300(b)

WATER QUALITY CRITERIA FOR TOXICS AND OTHER DELETERIOUS SUBSTANCES (µg/l unless shown otherwise)

Pollutant CAS Number	Type of Pollutant	Drinking Water [1]	Stock-water [2]	Irrigation Water [3]	Aquatic Life for Fresh Water		Aquatic Life for Marine Water		Human Health for Consumption of:		References [4]
					Acute (CMC)	Chronic (CCC)	Acute (CMC)	Chronic (CCC)	Water + Aquatic Organisms	Aquatic Organisms Only	
Endrin [43] 72208	PEST SVOC	**2**	—	—	**0.086** (1-hr avg) [11, 20]	**0.036** (4-day avg) [12, 20, 44]	**0.037** (24-hr max) [6, 7]	**0.0023** (24-hr avg) [7, 10, 29]	**0.76** [5]	**0.81** [5, 32]	**Drinking Water:** 18 AAC 80.300(b) **Aquatic Life:** 57 FR 60848 65 FR 31682 67 FR 79091 EPA 440-5-80-047 EPA 820-B-96-001 EPA 822-Z-99-001 EPA NRWQC 2006 **Human Health:** 65 FR 31682 67 FR 79091 EPA 440-5-80-047 EPA 822-Z-99-001
Endrin Aldehyde 7421934	PEST SVOC	—	—	—	—	—	—	—	**0.76** [5]	**0.81** [5, 32]	**Human Health:** 57 FR 60848 65 FR 31682 EPA 822-Z-99-001
Ethylbenzene 100414	VOC	**700**	—	—	—	—	—	—	**3,100** [5]	**29,000** [5]	**Drinking Water:** 18 AAC 80.300(b) **Human Health:** 57 FR 60848 65 FR 31682 67 FR 79091 EPA 440-5-80-048 EPA 822-Z-99-001
Ethylene Dibromide 106934	PEST	**0.05**	—	—	—	—	—	—	—	—	**Drinking Water:** 18 AAC 80.300(b)
Fluoranthene 206440	SVOC	—	—	—	—	—	—	—	**300** [5]	**370** [5]	**Human Health:** 57 FR 60848 65 FR 31682 EPA 440-5-80-049 EPA 822-Z-99-001

WATER QUALITY CRITERIA FOR TOXICS AND OTHER DELETERIOUS SUBSTANCES (µg/l unless shown otherwise)

Pollutant CAS Number	Type of Pollutant	Drinking Water [1]	Stock-water [2]	Irrigation Water [3]	Aquatic Life for Fresh Water		Aquatic Life for Marine Water		Human Health for Consumption of:		References [4]
					Acute (CMC)	Chronic (CCC)	Acute (CMC)	Chronic (CCC)	Water + Aquatic Organisms	Aquatic Organisms Only	
Fluorene 86737	SVOC	—	—	—	—	—	—	—	**1,300** [5]	**14,000** [5]	**Human Health:** 57 FR 60848 65 FR 31682 EPA 440-5-80-069 EPA 822-Z-99-001
Fluoride 16984488	INORG	**4,000**	—	**1,000**	—	—	—	—	—	—	**Drinking Water:** 18 AAC 80.300(b) **Irrigation:** EPA Blue Book
Glyphosate 1071836	PEST	**700**	—	—	—	—	—	—	—	—	**Drinking Water:** 18 AAC 80.300(b)
Gross alpha [45]	RAD	**15** (pCi/l)	—	—	—	—	—	—	—	—	**Drinking Water:** 18 AAC 80.300(b) 65 FR 76707
Gross beta	RAD	**4** millirems	—	—	—	—	—	—	—	—	**Drinking Water:** 18 AAC 80.300(b) 65 FR 76707
Guthion 86500	PEST	—	—	—	—	**0.01**	—	**0.01**	—	—	**Aquatic Life:** 67 FR 79091 EPA Red Book EPA 440-9-76-023 EPA 822-Z-99-001 EPA NRWQC 2006
Halocetic Acids (HAA5) (five)	DBP	**60**	—	—	—	—	—	—	—	—	**Drinking Water:** 18 AAC 80.300(b)
Heptachlor 76448	PEST SVOC	**0.4**	—	—	**0.52** (24-hr max) [6, 7]	**0.0038** (24-hr avg) [7, 10, 29]	**0.053** (24-hr max) [6, 7]	**0.0036** (24-hr avg) [7, 10, 29]	—	—	**Drinking Water:** 18 AAC 80.300(b) **Aquatic Life:** 57 FR 60848 65 FR 31682 67 FR 79091 EPA 440-5-80-052 EPA 822-Z-99-001 EPA NRWQC 2006

WATER QUALITY CRITERIA FOR TOXICS AND OTHER DELETERIOUS SUBSTANCES (µg/l unless shown otherwise)

Pollutant CAS Number	Type of Pollutant	Drinking Water [1]	Stock-water [2]	Irrigation Water [3]	Aquatic Life for Fresh Water		Aquatic Life for Marine Water		Human Health for Consumption of:		References [4]
					Acute (CMC)	Chronic (CCC)	Acute (CMC)	Chronic (CCC)	Water + Aquatic Organisms	Aquatic Organisms Only	
Heptachlor Epoxide [46] 1024573	PEST SVOC	**0.2**	—	—	**0.52** (24-hr max) [6, 7]	**0.0038** (24-hr avg) [7, 10, 29]	**0.053** (24-hr max) [6, 7]	**0.0036** (24-hr avg) [7, 10, 29]	—	—	**Drinking Water:** 18 AAC 80.300(b) **Aquatic Life:** 57 FR 60848 65 FR 31682 67 FR 79091 EPA 440-5-80-052 EPA 822-Z-99-001 EPA NRWQC 2006
Hexachloro-benzene 118741	SVOC	**1**	—	—	—	—	—	—	—	—	**Drinking Water:** 18 AAC 80.300(b)
Hexachloro-cyclopentadiene 77474	SVOC	**50**	—	—	—	—	—	—	**240** [5]	**17,000** [5, 32]	**Drinking Water:** 18 AAC 80.300(b) **Human Health:** 57 FR 60848 65 FR 31682 67 FR 79091 EPA 440-5-80-055 EPA 822-Z-99-001
Iron 7439896	INORG	—	—	**5,000**	—	**1,000**	—	—	—	—	**Irrigation:** EPA Blue Book **Aquatic Life (F):** 67 FR 79091 EPA Red Book EPA 440-9-76-023 EPA 822-Z-99-001 EPA NRWQC 2006

WATER QUALITY CRITERIA FOR TOXICS AND OTHER DELETERIOUS SUBSTANCES (µg/l unless shown otherwise)

Pollutant CAS Number	Type of Pollutant	Drinking Water [1]	Stock-water [2]	Irrigation Water [3]	Aquatic Life for Fresh Water		Aquatic Life for Marine Water		Human Health for Consumption of:		References [4]
					Acute (CMC)	Chronic (CCC)	Acute (CMC)	Chronic (CCC)	Water + Aquatic Organisms	Aquatic Organisms Only	
Lead 7439921	INORG	—	**50**	**5,000**	**See Appendix A** (1-hr avg) [11] *dissolved* [25, 41, 47]	**See Appendix A** (4-day avg) [12] *dissolved* [25, 41, 47]	**210** **See Appendix B** (1-hr avg) [11] *dissolved* [41, 48]	**8.1** **See Appendix B** (4-day avg) [12] *dissolved* [41, 49]	—	—	**Stockwater:** EPA Green Book **Irrigation:** EPA Blue Book **Aquatic Life:** 57 FR 60848 60 FR 22228 65 FR 31682 67 FR 79091 EPA 440-5-84-027 EPA 822-Z-99-001 EPA NRWQC 2006
Lindane (gamma-BHC) 58899	PEST SVOC	**0.2**	—	—	**0.95** (1-hr avg) [11, 20]	—	**0.16** (24-hr max) [6, 7]	—	—	—	**Drinking Water:** 18 AAC 80.300(b) **Aquatic Life:** 57 FR 60848 65 FR 31682 67 FR 79091 EPA 440-5-80-054 EPA 820-B-96-001 EPA 822-Z-99-001 EPA NRWQC 2006
Lithium 7439932	INORG	—	—	**2,500**	—	—	—	—	—	—	**Irrigation:** EPA Blue Book
Malathion 121755	PEST	—	—	—	—	**0.1**	—	**0.1**	—	—	**Aquatic Life:** 67 FR 79091 EPA Red Book EPA 440-9-76-023 EPA 822-Z-99-001 EPA NRWQC 2006
Manganese 7439965	INORG	—	—	**200**	—	—	—	—	**50** [50]	**100** [50]	**Irrigation:** EPA Blue Book **Human Health:** 67 FR 79091 EPA 440-9-76-023 EPA 440-5-86-001 EPA 822-Z-99-001 EPA NRWQC 2006

WATER QUALITY CRITERIA FOR TOXICS AND OTHER DELETERIOUS SUBSTANCES (µg/l unless shown otherwise)

Pollutant CAS Number	Type of Pollutant	Drinking Water [1]	Stock-water [2]	Irrigation Water [3]	Aquatic Life for Fresh Water		Aquatic Life for Marine Water		Human Health for Consumption of:		References [4]
					Acute (CMC)	Chronic (CCC)	Acute (CMC)	Chronic (CCC)	Water + Aquatic Organisms	Aquatic Organisms Only	
Mercury 7439976	INORG	**2**	—	—	**1.4** **See Appendix A** (1-hr avg) [11] *dissolved* [20, 51, 52]	**0.77** **See Appendix A** (4-day avg) [12] *dissolved* [20, 52, 53]	**1.8** **See Appendix B** (1-hr avg) [11] *dissolved* [52, 54, 55]	**0.94** **See Appendix B** (4-day avg) [12] *dissolved* [52, 55, 56]	**0.050** [5]	**0.051** [5]	**Drinking Water:** 18 AAC 80.300(b) **Aquatic Life:** 57 FR 60848 60 FR 22228 62 FR 42160 67 FR 79091 EPA 440-5-80-058 EPA 440-5-84-026 EPA 820-B-96-001 EPA 822-Z-99-001 EPA NRWQC 2006 **Human Health:** 65 FR 31682 EPA 440-5-80-058 EPA 822-Z-99-001
Methoxychlor 72435	PEST	**40**	—	—	—	**0.03**	—	**0.03**	—	—	**Drinking Water:** 18 AAC 80.300(b) **Aquatic Life:** 67 FR 79091 EPA Red Book EPA 440-9-76-023 EPA 822-Z-99-001 EPA NRWQC 2006
Methyl Bromide 74839	VOC	—	—	—	—	—	—	—	**48** [5]	**4,000** [5]	**Human Health:** 57 FR 60848 65 FR 31682 EPA 440-5-80-051 EPA 822-Z-99-001
Methyl-4,6-dinitrophenol, 2- 534521	SVOC	—	—	—	—	—	—	—	**13.4**	**765**	**Human Health:** 57 FR 60848 65 FR 31682 EPA 440-5-80-063 EPA 822-Z-99-001
Methylene Chloride (Dichloromethane) 75092	VOC	**5**	—	—	—	—	—	—	—	—	**Drinking Water:** 18 AAC 80.300(b)

WATER QUALITY CRITERIA FOR TOXICS AND OTHER DELETERIOUS SUBSTANCES (µg/l unless shown otherwise)

Pollutant CAS Number	Type of Pollutant	Drinking Water [1]	Stock-water [2]	Irrigation Water [3]	Aquatic Life for Fresh Water		Aquatic Life for Marine Water		Human Health for Consumption of:		References [4]
					Acute (CMC)	Chronic (CCC)	Acute (CMC)	Chronic (CCC)	Water + Aquatic Organisms	Aquatic Organisms Only	
Mirex 2385855	PEST	—	—	—	—	**0.001**	—	**0.001**	—	—	**Aquatic Life:** 67 FR 79091 EPA Red Book EPA 440-9-76-023 EPA 822-Z-99-001 EPA NRWQC 2006
Molybdenum 7439987	INORG	—	—	**10**	—	—	—	—	—	—	**Irrigation:** EPA Blue Book
Monochloro-benzene 108907	VOC	**100**	—	—	—	—	—	—	—	—	**Drinking Water:** 18 AAC 80.300(b)
Nickel 7440020	INORG	— [57]	—	**200**	**See Appendix A** (1-hr avg) [11] *dissolved* [20, 25]	**See Appendix A** (4-day avg) [12] *dissolved* [20, 25]	**74** **See Appendix B** (1-hr avg) [11] *dissolved* [41, 58]	**8.2** **See Appendix B** (4-day avg) [12] *dissolved* [41, 59]	**610** [5]	**4,600** [5]	**Drinking Water:** 18 AAC 80.300(b) 60 FR 33929 63 FR 10273 **Irrigation:** EPA Blue Book **Aquatic Life:** 57 FR 60848 60 FR 22228 65 FR 31682 67 FR 79091 69 FR 63079 EPA 440-5-80-060 EPA 440-5-86-004 EPA 820-B-96-001 EPA 822-Z-99-001 EPA NRWQC 2006 **Human Health:** 65 FR 31682 67 FR 79091 EPA 440-5-80-060 EPA 822-Z-99-001 EPA NRWQC 2006
Nitrate (as nitrogen) 14797558	INORG	**10,000**	—	—	—	—	—	—	—	—	**Drinking Water:** 18 AAC 80.300(b)

WATER QUALITY CRITERIA FOR TOXICS AND OTHER DELETERIOUS SUBSTANCES (µg/l unless shown otherwise)

Pollutant CAS Number	Type of Pollutant	Drinking Water [1]	Stock-water [2]	Irrigation Water [3]	Aquatic Life for Fresh Water		Aquatic Life for Marine Water		Human Health for Consumption of:		References [4]
					Acute (CMC)	Chronic (CCC)	Acute (CMC)	Chronic (CCC)	Water + Aquatic Organisms	Aquatic Organisms Only	
Nitrite (as nitrogen) 14797650	INORG	**1,000**	—	—	—	—	—	—	—	—	**Drinking Water:** 18 AAC 80.300(b)
Total Nitrate and Nitrite (as nitrogen)	INORG	**10,000**	—	—	—	—	—	—	—	—	**Drinking Water:** 18 AAC 80.300(b)
Nitrobenzene 98953	SVOC	—	—	—	—	—	—	—	**17** [5]	**1,900** [5, 32]	**Human Health:** 57 FR 60848 65 FR 31682 EPA 440-5-80-061 EPA 822-Z-99-001
Nonylphenol 1044051	OOC	—	—	—	**28**	**6.6**	**7.0**	**1.7**	—	—	**Aquatic Life:** 71 FR 9337 EPA NRWQC 2006
Oxamyl (Vydate) 23135220	PEST	**200**	—	—	—	—	—	—	—	—	**Drinking Water:** 18 AAC 80.300(b)
Parathion 56382	PEST	—	—	—	**0.065** (1-hr avg) [11, 20, 60]	**0.013** (4-day avg) [12, 20, 60]	—	—	—	—	**Aquatic Life (F):** 67 FR 79091 EPA 440-5-86-001 EPA 820-B-96-001 EPA 822-Z-99-001 EPA NRWQC 2006
Pentachloro-benzene 608935	OOC	—	—	—	—	—	—	—	**3.5** [5]	**4.1** [5]	**Human Health:** EPA 440-5-80-028 EPA 822-Z-99-001
Pentachloro-phenol 87865	PEST	**1**	—	—	Criterion is pH dependent: $e^{1.005(pH)-4.869}$ (1-hr avg) [11, 20]	Criterion is pH dependent: $e^{1.005(pH)-5.134}$ (4-day avg) [12, 20]	**13** (1-hr avg) [11, 41]	**7.9** (4-day avg) [12, 41]	—	—	**Drinking Water:** 18 AAC 80.300(b) **Aquatic Life:** 57 FR 60848 65 FR 31682 67 FR 79091 69 FR 63079 EPA 440-5-86-009 EPA 820-B-96-001 EPA 822-Z-99-001 EPA NRWQC 2006

WATER QUALITY CRITERIA FOR TOXICS AND OTHER DELETERIOUS SUBSTANCES (µg/l unless shown otherwise)

Pollutant CAS Number	Type of Pollutant	Drinking Water [1]	Stock-water [2]	Irrigation Water [3]	Aquatic Life for Fresh Water		Aquatic Life for Marine Water		Human Health for Consumption of:		References [4]
					Acute (CMC)	Chronic (CCC)	Acute (CMC)	Chronic (CCC)	Water + Aquatic Organisms	Aquatic Organisms Only	
Phenol 108952	SVOC	—	—	—	—	—	—	—	**21,000** [5]	**4,600,000** [5,32]	**Human Health:** 57 FR 60848 65 FR 31682 EPA 440-5-80-066 EPA 822-Z-99-001
Phosphorous (elemental) 7723140	INORG	—	—	—	—	—	—	**0.1** [61]	—	—	**Aquatic Life (S):** 67 FR 79091 EPA Red Book EPA 440-9-76-023 EPA 822-Z-99-001 EPA NRWQC 2006
Picloram 1918021	PEST	**500**	—	—	—	—	—	—	—	—	**Drinking Water:** 18 AAC 80.300(b)
Polychlorinated Biphenyls (PCBs) [62]	SVOC	**0.5**	—	—	—	**0.014** (24-hr avg) [10, 29]	—	**0.03** (24-hr avg) [10, 29]	—	—	**Drinking Water:** 18 AAC 80.300(b) **Aquatic Life:** 57 FR 60848 65 FR 31682 67 FR 79091 EPA 440-5-80-068 EPA 822-Z-99-001 EPA NRWQC 2006
Pyrene 129000	SVOC	—	—	—	—	—	—	—	**960** [5]	**11,000** [5]	**Human Health:** 57 FR 60848 65 FR 31682 EPA 440-5-80-069 EPA 822-Z-99-001
Radium-226 and -228 (combined) 13982-63-3 15262-20-1	RAD	**5** (pCi/l)	—	—	—	—	—	—	—	—	**Drinking Water:** 18 AAC 80.300(b) 65 FR 76707

WATER QUALITY CRITERIA FOR TOXICS AND OTHER DELETERIOUS SUBSTANCES (µg/l unless shown otherwise)

Pollutant CAS Number	Type of Pollutant	Drinking Water [1]	Stock-water [2]	Irrigation Water [3]	Aquatic Life for Fresh Water		Aquatic Life for Marine Water		Human Health for Consumption of:		References [4]
					Acute (CMC)	Chronic (CCC)	Acute (CMC)	Chronic (CCC)	Water + Aquatic Organisms	Aquatic Organisms Only	
Selenium 7782492	INORG	**50**	**10**	**20**	**See Note [63]** (1-hr avg) [11] *total recoverable* [64, 65]	**5.0** (4-day avg) [12] *total recoverable* [65]	**290** **See Appendix B** (1-hr avg) [11] *dissolved* [41, 66, 67]	**71** **See Appendix B** (4-day avg) [12] *dissolved* [41, 66, 68]	**170**	**11,000**	**Drinking Water:** 18 AAC 80.300(b) **Stockwater:** EPA Green Book **Irrigation:** EPA Blue Book **Aquatic Life:** 57 FR 60848 60 FR 22228 61 FR 58444 62 FR 42160 65 FR 31682 67 FR 79091 69 FR 63079 EPA 440-5-87-006 EPA 820-B-96-001 EPA 822-Z-99-001 EPA NRWQC 2006 **Human Health:** 67 FR 79091 EPA 822-Z-99-001
Silver 7440224	INORG	—	—	—	**See Appendix A** (1-hr avg) [11] *dissolved* [7, 25]	—	**1.9** **See Appendix B** (1-hr avg) [11] *dissolved* [7, 69]	—	—	—	**Aquatic Life:** 57 FR 60848 60 FR 22228 65 FR 31682 67 FR 79091 EPA 440-5-80-071 EPA 822-Z-99-001 EPA NRWQC 2006
Simazine 122349	PEST	**4**	—	—	—	—	—	—	—	—	**Drinking Water:** 18 AAC 80.300(b)
Strontium-90 10098972	RAD	**8** (pCi/l)	—	—	—	—	—	—	—	—	**Drinking Water:** 18 AAC 80.300(b)
Styrene 100425	OOC	**100**	—	—	—	—	—	—	—	—	**Drinking Water:** 18 AAC 80.300(b)

WATER QUALITY CRITERIA FOR TOXICS AND OTHER DELETERIOUS SUBSTANCES (µg/l unless shown otherwise)

Pollutant CAS Number	Type of Pollutant	Drinking Water [1]	Stock-water [2]	Irrigation Water [3]	Aquatic Life for Fresh Water		Aquatic Life for Marine Water		Human Health for Consumption of:		References [4]
					Acute (CMC)	Chronic (CCC)	Acute (CMC)	Chronic (CCC)	Water + Aquatic Organisms	Aquatic Organisms Only	
Sulfide/ Hydrogen Sulfide 7783064	INORG	—	—	—	—	**2.0** *undissociated hydrogen sulfide*	—	**2.0** *undissociated hydrogen sulfide*	—	—	**Aquatic Life:** 67 FR 79091 EPA Red Book EPA 440-9-76-023 EPA 822-Z-99-001 EPA NRWQC 2006
Tetrachloro-benzene, 1,2,4,5- 95943	OOC	—	—	—	—	—	—	—	**2.3** [5]	**2.9** [5]	**Human Health:** EPA 440-5-80-028 EPA 822-Z-99-001
Tetrachloro-ethylene 127184	VOC	**5**	—	—	—	—	—	—	—	—	**Drinking Water:** 18 AAC 80.300(b)
Thallium 7440280	INORG	**2**	—	—	—	—	—	—	**1.7** [5]	**6.3** [5]	**Drinking Water:** 18 AAC 80.300(b) **Human Health:** 57 FR 60848 65 FR 31682 67 FR 79091 EPA 440-5-80-074 EPA 822-Z-99-001
Toluene 108883	VOC	**1,000**	—	—	—	—	—	—	**6,800** [5]	**200,000** [5]	**Drinking Water:** 18 AAC 80.300(b) **Human Health:** 57 FR 60848 65 FR 31682 67 FR 79091 EPA 440-5-80-075 EPA 822-Z-99-001
Total Trihalomethanes (TTHMs) [70]	DBP	**80**	—	—	—	—	—	—	—	—	**Drinking Water:** 18 AAC 80.300(b)

WATER QUALITY CRITERIA FOR TOXICS AND OTHER DELETERIOUS SUBSTANCES (µg/l unless shown otherwise)

Pollutant CAS Number	Type of Pollutant	Drinking Water [1]	Stock-water [2]	Irrigation Water [3]	Aquatic Life for Fresh Water		Aquatic Life for Marine Water		Human Health for Consumption of:		References [4]
					Acute (CMC)	Chronic (CCC)	Acute (CMC)	Chronic (CCC)	Water + Aquatic Organisms	Aquatic Organisms Only	
Toxaphene 8001352	PEST	**3**	—	—	**0.73** (1-hr avg) [11]	**0.0002** (4-day avg) [12, 29]	**0.21** (1-hr avg) [11]	**0.0002** (4-day avg) [12, 29]	—	—	**Drinking Water:** 18 AAC 80.300(b) **Aquatic Life:** 57 FR 60848 65 FR 31682 67 FR 79091 69 FR 63079 EPA 440-5-86-006 EPA 822-Z-99-001 EPA NRWQC 2006
Tributyltin (TBT) 688733	PEST	—	—	—	**0.46** (1-hr avg) [11, 71]	**0.072** (4-day avg) [12, 71]	**0.42** (1-hr avg) [11, 71]	**0.0074** (4-day avg) [12, 71]	—	—	**Aquatic Life:** 62 FR 42554 EPA 822-D-97-001 EPA 822-R-03-031 EPA NRWQC 2006
Trichlorobenzene 1,2,4- 120821	SVOC	**70**	—	—	—	—	—	—	**260**	**940**	**Drinking Water:** 18 AAC 80.300(b) **Human Health:** 67 FR 79091 EPA 822-Z-99-001
Trichloroethane 1,1,1- 71556	VOC	**200**	—	—	—	—	—	—	—	—	**Drinking Water:** 18 AAC 80.300(b)
Trichloroethane 1,1,2- 79005	VOC	**5**	—	—	—	—	—	—	—	—	**Drinking Water:** 18 AAC 80.300(b)
Trichloro-ethylene 79016	VOC	**5**	—	—	—	—	—	—	—	—	**Drinking Water:** 18 AAC 80.300(b)
Trichlorophenol 2,4,5- 95954	OOC	—	—	—	—	—	—	—	**2,600** [5]	**9,800** [5]	**Human Health:** EPA 440-5-80-032 EPA 822-Z-99-001

WATER QUALITY CRITERIA FOR TOXICS AND OTHER DELETERIOUS SUBSTANCES (µg/l unless shown otherwise)

Pollutant CAS Number	Type of Pollutant	Drinking Water [1]	Stock-water [2]	Irrigation Water [3]	Aquatic Life for Fresh Water		Aquatic Life for Marine Water		Human Health for Consumption of:		References [4]
					Acute (CMC)	Chronic (CCC)	Acute (CMC)	Chronic (CCC)	Water + Aquatic Organisms	Aquatic Organisms Only	
(Trichloro-phenoxy 2,4,5-)-Propionic Acid (2,4,5-TP) 93721	PEST	**50**	—	—	—	—	—	—	—	—	**Drinking Water:** 18 AAC 80.300(b)
Tritium 10028178	RAD	**20,000** (pCi/l)	—	—	—	—	—	—	—	—	**Drinking Water:** 18 AAC 80.300(b)
Uranium 7440611	RAD	**30**	—	—	—	—	—	—	—	—	**Drinking Water:** 18 AAC 80.300(b) 65 FR 76707
Vanadium 7440622	INORG	—	—	**100**	—	—	—	—	—	—	**Irrigation:** EPA Blue Book
Vinyl Chloride 75014	VOC	**2**	—	—	—	—	—	—	—	—	**Drinking Water:** 18 AAC 80.300(b)
Xylenes (total) 1330-20-7	VOC	**10,000**	—	—	—	—	—	—	—	—	**Drinking Water:** 18 AAC 80.300(b)
Zinc 7440666	INORG	—	—	**2,000**	**See Appendix A** (1-hr avg) [11] *dissolved* [20, 25]	**See Appendix A** (4-day avg) [12] *dissolved* [20, 25]	**90** **See Appendix B** (1-hr avg) [11] *dissolved* [41, 72]	**81** **See Appendix B** (4-day avg) [12] *dissolved* [41, 73]	**9,100**	**69,000**	**Irrigation:** EPA Blue Book **Aquatic Life:** 60 FR 22228 65 FR 31682 67 FR 79091 69 FR 63079 EPA 440-5-87-003 EPA 820-B-96-001 EPA NRWQC 2006 **Human Health:** EPA 822-Z-99-001

APPENDIX A. PARAMETERS FOR CALCULATING FRESHWATER DISSOLVED METALS CRITERIA THAT ARE HARDNESS-DEPENDENT [74]

Metal [25]	m_A	b_A	m_C	b_C	Freshwater Conversion Factors (CF)	
					Acute (CMC) [11]	Chronic (CCC) [12]
Arsenic	—	—	—	—	1.000	1.000
Cadmium	1.0166	-3.924	0.7409	-4.719	1.136672-[(ln hardness)(0.041838)]	1.101672-[(ln hardness)(0.041838)]
Chromium III	0.819	3.7256	0.819	0.6848	0.316	0.860
Chromium VI	—	—	—	—	0.982	0.962
Copper	0.9422	-1.700	0.8545	-1.702	0.960	0.960
Lead	1.273	-1.460	1.273	-4.705	1.46203-[(ln hardness)(0.145712)]	1.46203-[(ln hardness)(0.145712)]
Mercury	—	—	—	—	0.85	0.85
Nickel	0.846	2.255	0.846	0.0584	0.998	0.997
Silver	1.72	-6.59	—	—	0.85	—
Zinc	0.8473	0.884	0.8473	0.884	0.978	0.986

Hardness-dependent criteria may be calculated from the following for freshwater metals:

Acute (*dissolved*) = $\exp\{m_A[\ln(\text{hardness})] + b_A\}$ (CF)

Chronic (*dissolved*) = $\exp\{m_C[\ln(\text{hardness})] + b_C\}$ (CF)

APPENDIX B. CONVERSION FACTORS FOR SALTWATER DISSOLVED METALS CRITERIA [74]

Metal	Saltwater Conversion Factors (CF)	
	Acute (CMC) [11]	Chronic (CCC) [12]
Arsenic	1.000	1.000
Cadmium	0.994	0.994
Chromium VI	0.993	0.993
Copper	0.83	0.83
Lead	0.951	0.951
Mercury	0.85	0.85
Nickel	0.990	0.990
Selenium	0.998	0.998
Silver	0.85	—
Zinc	0.946	0.946

APPENDIX C. ACUTE, FRESHWATER AMMONIA CRITERIA

The one-hour average concentration of total ammonia nitrogen (in mg N/L) does not exceed, more than once every three years on the average, the CMC (acute criterion) calculated using the following equations. The acute criterion for total ammonia for freshwater aquatic life in Table I of this manual must be based on the following criteria: [11,75]

	Total Ammonia Nitrogen in mg-N/L	
	Acute Criteria with Salmonids Present	**Acute Criteria with Salmonids Absent**
pH	$\text{Acute} = \frac{0.275}{1+10^{7.204-\text{pH}}} + \frac{39.0}{1+10^{\text{pH}-7.204}}$	$\text{Acute} = \frac{0.411}{1+10^{7.204-\text{pH}}} + \frac{58.4}{1+10^{\text{pH}-7.204}}$
6.5	32.6	48.8
6.6	31.3	46.8
6.7	29.8	44.6
6.8	28.1	42.0
6.9	26.2	39.1
7.0	24.1	36.1
7.1	22.0	32.8
7.2	19.7	29.5
7.3	17.5	26.2
7.4	15.4	23.0
7.5	13.3	19.9
7.6	11.4	17.0
7.7	9.65	14.4
7.8	8.11	12.1
7.9	6.77	10.1
8.0	5.62	8.40
8.1	4.64	6.95
8.2	3.83	5.72
8.3	3.15	4.71
8.4	2.59	3.88
8.5	2.14	3.20
8.6	1.77	2.65
8.7	1.47	2.20
8.8	1.23	1.84
8.9	1.04	1.56
9.0	0.885	1.32

APPENDIX D. CHRONIC, FRESHWATER AMMONIA CRITERIA

Based on pH and Temperature When Early Life Stages of Fish are Present [15, 75]

The thirty-day average concentration of total ammonia nitrogen (in mg N/L) does not exceed, more than once every three years on the average, the CCC (chronic criterion) calculated using the following equations.[15] The chronic criterion for total ammonia for the fresh water aquatic life criteria in Table I of this manual must be based on Table V below when early stages of fish are present:

Total Ammonia in mg-N/L

$$\text{Chronic} = \left(\frac{0.0577}{1 + 10^{7.688-\text{pH}}} + \frac{2.487}{1 + 10^{\text{pH}-7.688}} \right) \bullet \text{MIN}\,(2.85, 1.45 \cdot 10^{0.028(25-T)})$$

pH	Temperature									
	0°C	**14°C**	**16°C**	**18°C**	**20°C**	**22°C**	**24°C**	**26°C**	**28°C**	**30°C**
6.5	6.67	6.67	6.06	5.33	4.68	4.12	3.62	3.18	2.80	2.46
6.6	6.57	6.57	5.97	5.25	4.61	4.05	3.56	3.13	2.75	2.42
6.7	6.44	6.44	5.86	5.15	4.52	3.98	3.50	3.07	2.70	2.37
6.8	6.29	6.29	5.72	5.03	4.42	3.89	3.42	3.00	2.64	2.32
6.9	6.12	6.12	5.56	4.89	4.30	3.78	3.32	2.92	2.57	2.25
7.0	5.91	5.91	5.37	4.72	4.15	3.65	3.21	2.82	2.48	2.18
7.1	5.67	5.67	5.15	4.53	3.98	3.50	3.08	2.70	2.38	2.09
7.2	5.39	5.39	4.90	4.31	3.78	3.33	2.92	2.57	2.26	1.99
7.3	5.08	5.08	4.61	4.06	3.57	3.13	2.76	2.42	2.13	1.87
7.4	4.73	4.73	4.30	3.78	3.32	2.92	2.57	2.26	1.98	1.74
7.5	4.36	4.36	3.97	3.49	3.06	2.69	2.37	2.08	1.83	1.61
7.6	3.98	3.98	3.61	3.18	2.79	2.45	2.16	1.90	1.67	1.47
7.7	3.58	3.58	3.25	2.86	2.51	2.21	1.94	1.71	1.50	1.32
7.8	3.18	3.18	2.89	2.54	2.23	1.96	1.73	1.52	1.33	1.17
7.9	2.80	2.80	2.54	2.24	1.96	1.73	1.52	1.33	1.17	1.03
8.0	2.43	2.43	2.21	1.94	1.71	1.50	1.32	1.16	1.02	0.897
8.1	2.10	2.10	1.91	1.68	1.47	1.29	1.14	1.00	0.879	0.773
8.2	1.79	1.79	1.63	1.43	1.26	1.11	0.973	0.855	0.752	0.661
8.3	1.52	1.52	1.39	1.22	1.07	0.941	0.827	0.727	0.639	0.562
8.4	1.29	1.29	1.17	1.03	0.906	0.796	0.700	0.615	0.541	0.475
8.5	1.09	1.09	0.990	0.870	0.765	0.672	0.591	0.520	0.457	0.401
8.6	0.920	0.920	0.836	0.735	0.646	0.568	0.499	0.439	0.386	0.339
8.7	0.778	0.778	0.707	0.622	0.547	0.480	0.422	0.371	0.326	0.287
8.8	0.661	0.661	0.601	0.528	0.464	0.408	0.359	0.315	0.277	0.244
8.9	0.565	0.565	0.513	0.451	0.397	0.349	0.306	0.269	0.237	0.208
9.0	0.486	0.486	0.422	0.389	0.342	0.300	0.264	0.232	0.204	0.179

APPENDIX E. CHRONIC, FRESHWATER AMMONIA CRITERIA

Based on pH and Temperature When Early Life Stages of Fish are Absent [15, 75, 76]

The thirty-day average concentration of total ammonia nitrogen (in mg N/L) does not exceed, more than once every three years on the average, the CCC (chronic criterion) calculated using the following equations.[15] The chronic criterion for total ammonia for the fresh water aquatic life criteria in Table I of this manual must be based on Table VI when early life stages of fish are absent:

Total Ammonia in mg-N/L

$$\text{Chronic} = \left(\frac{0.0577}{1 + 10^{7.688 - \text{pH}}} + \frac{2.487}{1 + 10^{\text{pH} - 7.688}} \right) \bullet 1.45 \cdot 10^{0.028 \cdot (25 - \text{MAX}(T,7))}$$

pH	Temperature									
	0-7°C	**8°C**	**9°C**	**10°C**	**11°C**	**12°C**	**13°C**	**14°C**	**15°C**[76]	**16°C**[76]
6.5	10.8	10.1	9.51	8.92	8.36	7.84	7.35	6.89	6.46	6.06
6.6	10.7	9.99	9.37	8.79	8.24	7.72	7.24	6.79	6.36	5.97
6.7	10.5	9.81	9.20	8.62	8.08	7.58	7.11	6.66	6.25	5.86
6.8	10.2	9.58	8.98	8.42	7.90	7.40	6.94	6.51	6.10	5.72
6.9	9.93	9.31	8.73	8.19	7.68	7.20	6.75	6.33	5.93	5.56
7.0	9.60	9.00	8.43	7.91	7.41	6.95	6.52	6.11	5.73	5.37
7.1	9.20	8.63	8.09	7.58	7.11	6.67	6.25	5.86	5.49	5.15
7.2	8.75	8.20	7.69	7.21	6.76	6.34	5.94	5.57	5.22	4.90
7.3	8.24	7.73	7.25	6.79	6.37	5.97	5.60	5.25	4.92	4.61
7.4	7.69	7.21	6.76	6.33	5.94	5.57	5.22	4.89	4.59	4.30
7.5	7.09	6.64	6.23	5.84	5.48	5.13	4.81	4.51	4.23	3.97
7.6	6.46	6.05	5.67	5.32	4.99	4.68	4.38	4.11	3.85	3.61
7.7	5.81	5.45	5.11	4.79	4.49	4.21	3.95	3.70	3.47	3.25
7.8	5.17	4.84	4.54	4.26	3.99	3.74	3.51	3.29	3.09	2.89
7.9	4.54	4.26	3.99	3.74	3.51	3.29	3.09	2.89	2.71	2.54
8.0	3.95	3.70	3.47	3.26	3.05	2.86	2.68	2.52	2.36	2.21
8.1	3.41	3.19	2.99	2.81	2.63	2.47	2.31	2.17	2.03	1.91
8.2	2.91	2.73	2.56	2.40	2.25	2.11	1.98	1.85	1.74	1.63
8.3	2.47	2.32	2.18	2.04	1.91	1.79	1.68	1.58	1.48	1.39
8.4	2.09	1.96	1.84	1.73	1.62	1.52	1.42	1.33	1.25	1.17
8.5	1.77	1.66	1.55	1.46	1.37	1.28	1.20	1.13	1.06	0.990
8.6	1.49	1.40	1.31	1.23	1.15	1.08	1.01	0.951	0.892	0.836
8.7	1.26	1.18	1.11	1.04	0.976	0.915	0.858	0.805	0.754	0.707
8.8	1.07	1.01	0.944	0.885	0.829	0.778	0.729	0.684	0.641	0.601
8.9	0.917	0.860	0.806	0.756	0.709	0.664	0.623	0.584	0.548	0.513
9.0	0.790	0.740	0.694	0.651	0.610	0.572	0.536	0.503	0.471	0.442

APPENDIX F. TOTAL AMMONIA ACUTE CRITERIA FOR SALTWATER AQUATIC LIFE [11, 75,77, 78]

The acute criterion for total ammonia for the saltwater aquatic life criteria in Table I of this manual must be based on the following criteria:

Total Ammonia in mg-N/L at 10 g/kg Salinity								
pH	**Temperature**							
	0°C	**5°C**	**10°C**	**15°C**	**20°C**	**25°C**	**30°C**	**35°C**
7.0	222.4	157.3	107.9	75.8	51.1	36.2	23.9	17.3
7.2	144.1	99.6	68.4	47.8	32.9	22.2	15.6	10.7
7.4	90.6	63.4	42.8	28.8	20.6	14.0	9.9	6.8
7.6	56.8	39.5	27.2	18.9	13.2	9.1	6.3	4.6
7.8	36.2	25.5	17.3	12.4	8.2	5.8	4.1	2.9
8.0	22.2	15.6	10.7	7.7	5.3	3.8	2.6	1.9
8.2	14.8	9.9	7.0	4.8	3.5	2.4	1.7	1.2
8.4	9.1	6.5	4.4	3.0	2.2	1.6	1.2	0.8
8.6	6.0	4.1	2.9	2.1	1.5	1.1	0.8	0.6
8.8	3.8	2.7	1.9	1.4	1.0	0.8	0.6	0.5
9.0	2.4	1.7	1.2	0.9	0.7	0.6	0.4	0.4
Total Ammonia in mg-N/L at 20 g/kg Salinity								
pH	**Temperature**							
	0°C	**5°C**	**10°C**	**15°C**	**20°C**	**25°C**	**30°C**	**35°C**
7.0	239.6	164.7	112.8	79.1	52.7	36.2	25.5	17.3
7.2	150.7	102.9	71.6	49.4	34.6	23.9	16.5	11.5
7.4	95.5	65.1	44.5	30.5	22.2	14.8	9.9	7.2
7.6	60.1	41.2	28.8	18.9	14.0	9.1	6.5	4.6
7.8	37.9	25.5	18.9	12.4	9.1	6.2	4.3	2.9
8.0	23.9	16.5	11.5	8.1	5.5	4.0	2.7	1.9
8.2	15.6	10.7	7.3	5.1	3.6	2.6	1.7	1.3
8.4	9.9	6.7	4.6	3.3	2.4	1.6	1.2	0.9
8.6	6.2	4.3	3.0	2.2	1.6	1.2	0.8	0.6
8.8	4.0	2.7	2.1	1.4	1.1	0.8	0.6	0.5
9.0	2.6	1.9	1.3	1.0	0.7	0.6	0.4	0.4
Total Ammonia in mg-N/L at 30 g/kg Salinity								
pH	**Temperature**							
	0°C	**5°C**	**10°C**	**15°C**	**20°C**	**25°C**	**30°C**	**35°C**
7.0	256.9	171.3	121.9	84.0	58.5	39.5	27.2	18.9
7.2	161.4	111.2	77.4	52.7	36.2	25.5	17.3	12.4
7.4	102.9	70.0	47.8	32.9	22.2	15.6	10.7	7.7
7.6	65.1	44.5	30.5	20.6	17.3	9.9	7.0	4.9
7.8	41.2	27.2	18.9	13.2	9.1	6.5	4.4	3.0
8.0	25.5	17.3	12.4	8.2	6.0	4.1	2.9	2.1
8.2	16.5	11.5	7.9	5.5	3.8	2.7	1.9	1.4
8.4	10.5	7.2	4.9	3.5	2.4	1.7	1.3	0.9
8.6	6.7	4.6	3.3	2.2	1.6	1.2	0.9	0.7
8.8	4.3	2.9	2.1	1.5	1.1	0.8	0.6	0.5
9.0	2.7	1.9	1.4	1.0	0.8	0.6	0.5	0.4

APPENDIX G. TOTAL AMMONIA CHRONIC CRITERIA FOR SALTWATER AQUATIC LIFE [12, 75, 77, 78]

The chronic criterion for total ammonia for the saltwater aquatic life criteria in Table I of this manual must be based on the following criteria:

Total Ammonia in mg-N/L at 10 g/kg Salinity								
pH	**Temperature**							
	0°C	**5°C**	**10°C**	**15°C**	**20°C**	**25°C**	**30°C**	**35°C**
7.0	33.8	23.9	16.5	11.5	7.7	5.4	3.6	2.6
7.2	21.4	14.8	9.9	7.2	4.9	3.4	2.3	1.6
7.4	14.0	9.9	6.4	4.4	3.0	2.1	1.5	1.0
7.6	8.2	5.9	4.1	2.8	2.0	1.4	1.0	0.7
7.8	5.4	3.9	2.6	1.8	1.2	0.9	0.6	0.4
8.0	3.4	2.4	1.6	1.2	0.8	0.6	0.4	0.3
8.2	2.2	1.5	1.1	0.7	0.5	0.4	0.3	0.2
8.4	1.4	1.0	0.7	0.5	0.3	0.2	0.2	0.1
8.6	0.9	0.6	0.4	0.3	0.2	0.2	0.1	0.1
8.8	0.6	0.4	0.3	0.2	0.1	0.1	0.1	0.1
9.0	0.4	0.3	0.2	0.1	0.1	0.1	0.1	0.1
Total Ammonia in mg-N/L at 20 g/kg Salinity								
pH	**Temperature**							
	0°C	**5°C**	**10°C**	**15°C**	**20°C**	**25°C**	**30°C**	**35°C**
7.0	36.2	24.7	17.3	11.5	8.0	5.4	3.9	2.6
7.2	22.2	15.6	10.7	7.4	5.1	3.6	2.5	1.7
7.4	14.8	9.9	6.7	4.6	3.4	2.2	1.6	1.1
7.6	9.1	6.2	4.4	2.8	2.1	1.4	1.0	0.7
7.8	5.7	3.9	2.8	1.9	1.3	0.9	0.6	0.4
8.0	3.6	2.5	1.7	1.2	0.8	0.6	0.4	0.3
8.2	2.3	1.6	1.1	0.8	0.5	0.4	0.3	0.2
8.4	1.5	1.0	0.7	0.5	0.4	0.2	0.2	0.1
8.6	0.9	0.6	0.5	0.3	0.2	0.2	0.1	0.1
8.8	0.6	0.4	0.3	0.2	0.2	0.1	0.1	0.1
9.0	0.4	0.3	0.2	0.1	0.1	0.1	0.1	0.1
Total Ammonia in mg-N/L at 30 g/kg Salinity								
pH	**Temperature**							
	0°C	**5°C**	**10°C**	**15°C**	**20°C**	**25°C**	**30°C**	**35°C**
7.0	38.7	25.5	18.1	12.4	9.1	5.9	4.1	2.8
7.2	23.9	16.5	11.5	8.0	5.4	3.9	2.6	1.8
7.4	15.6	10.7	7.2	4.9	3.4	2.4	1.6	1.2
7.6	9.9	6.7	4.6	3.0	2.6	1.5	1.1	0.7
7.8	6.2	4.1	2.8	2.0	1.4	1.0	0.7	0.5
8.0	3.9	2.6	1.8	1.3	0.9	0.6	0.4	0.3
8.2	2.5	1.7	1.2	0.8	0.6	0.4	0.3	0.2
8.4	1.6	1.1	0.7	0.5	0.4	0.3	0.2	0.1
8.6	1.0	0.7	0.5	0.3	0.2	0.2	0.1	0.1
8.8	0.6	0.4	0.3	0.2	0.2	0.1	0.1	0.1
9.0	0.4	0.3	0.2	0.2	0.1	0.1	0.1	0.1

APPENDIX H. REFERENCES

NUMERIC REFERENCE	*FULL CITATION*
18 AAC 80.300(b)	State of Alaska Department of Environmental Conservation, *Drinking Water Regulations.* (November 9, 2006)
56 FR 30266	U.S. EPA, *National Primary Drinking Water Regulations; Monitoring for VOC; MCLGs and MCLs for Aldicarb, Aldicarb Sulfoxide, Aldicarb Sulfone, Pentachlorophenol, and Barium.* (July 1, 1991)
57 FR 60848	U.S. EPA, *Toxics criteria for those states not complying with Clean Water Act section 303(c)(2)(B).* (December 22, 1992) Also referred to as 40 CFR 131.36 or the "National Toxics Rule" or NTR.
60 FR 15393	U.S. EPA, *Great Lakes Aquatic Life Criteria Guidelines.* (March 23, 1995)
60 FR 22228	U.S. EPA, *Water Quality Standards; Establishment of Numeric Criteria for Priority Toxic Pollutants; States' Compliance – Revision of Metals Criteria.* (May 4, 1995)
60 FR 33929	U.S. EPA, *National Pollutant Discharge Elimination System and Pretreatment Programs; State and Local Assistance Programs; Effluent Limitations Guidelines and Standards; Public Water Supply and Underground Injection Control Programs: Removal of Legally Obsolete or Redundant Rules.* (June 29, 1995)
61 FR 58444	U.S. EPA, *Proposed Selenium Criterion Maximum Concentration for the Water Quality Guidance for the Great Lakes System.* (December 16, 1996)
62 FR 42160	U.S. EPA, *National Recommended Water Quality Criteria.*(December 7, 1998)
62 FR 42554	U.S. EPA, *Water Quality Criteria; Ambient Water Quality Criteria: Notice of Ambient Water Quality Criteria Document for Tributyltin (TBT) and Request for Comments.* (August 7, 1997)
63 FR 10140	U.S. EPA, *Withdrawal From Federal Regulations of the Applicability to Alaska's Waters of Arsenic Human Health Criteria.* (March 2, 1998)
63 FR 10273	U.S. EPA, *Announcement of the Drinking Water Contaminant Candidate List.* (March 2, 1998)
65 FR 31682	U.S. EPA, *Water Quality Standards; Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California.* (May 18, 2000) Also referred to as the "California Toxics Rule" or CTR.
65 FR 76707	U.S. EPA, *National Primary Drinking Water Regulations; Radionuclides; Final Rule.* (December 7, 2000)
66 FR 6976	U.S. EPA, *Arsenic and Clarifications to Compliance and New Source Contaminants Monitoring Final Rule.* (January 22, 2001)
67 FR 79091	U.S. EPA, *National Recommended Water Quality Criteria: 2002.* (December 27, 2002) Also referred to as "EPA 822-R-02-047."
68 FR 14501	U.S. EPA, *Minor Clarification of National Primary Drinking Water Regulation for Arsenic; Final Rule.* (March 25, 2003)

NUMERIC REFERENCE	***FULL CITATION***
69 FR 63079	U.S. EPA, *Withdrawal of Certain Federal Water Quality Criteria Applicable to Alaska, Arkansas, and Puerto Rico.* (October 29, 2004)
71 FR 9336	U.S. EPA, *Notice of Availability of Final Recommended Aquatic Life Ambient Water Quality Criteria for Diazinon.* (February 23, 2006)
71 FR 9337	U.S. EPA, *Notice of Availability of Final Aquatic Life Ambient Water Quality Criteria for Nonylphenol.* (February 23, 2006)
EPA 440-5-80-015	U.S. EPA, *Ambient Water Quality Criteria Document for Acenaphthene.* (1980)
EPA 440-5-80-019	U.S. EPA, *Ambient Water Quality Criteria for Aldrin/Dieldrin.* (December, 1980)
EPA 440-5-80-020	U.S. EPA, *Ambient Water Quality Criteria for Antimony.* (October, 1980)
EPA 440-5-80-027	U.S. EPA, *Ambient Water Quality Criteria for Chlordane.* (October, 1980)
EPA 440-5-80-028	U.S. EPA, *Ambient Water Quality Criteria for Chlorinated Benzenes.* (October, 1980)
EPA 440-5-80-030	U.S. EPA, *Ambient Water Quality Criteria for Chloroalkyl Ethers.* (October, 1980)
EPA 440-5-80-031	U.S. EPA, *Ambient Water Quality Criteria for Chlorinated Naphthalene.* (October, 1980)
EPA 440-5-80-032	U.S. EPA, *Ambient Water Quality Criteria for Chlorinated Phenols.* (October, 1980)
EPA 440-5-80-034	U.S. EPA, *Ambient Water Quality Criteria for 2-Chlorophenol.* (October, 1980)
EPA 440-5-80-037	U.S. EPA, *Ambient Water Quality Criteria for Cyanides.* (October, 1980)
EPA 440-5-80-038	U.S. EPA, *Ambient Water Quality Criteria for DDT.* (October, 1980)
EPA 440-5-80-039	U.S. EPA, *Ambient Water Quality Criteria for Dichlorobenzenes.* (October, 1980)
EPA 440-5-80-041	U.S. EPA, *Ambient Water Quality Criteria for Dichloroethylenes.* (October, 1980)
EPA 440-5-80-042	U.S. EPA, *Ambient Water Quality Criteria for 2,4-Dichlorophenol.* (October, 1980)
EPA 440-5-80-043	U.S. EPA, *Ambient Water Quality Criteria for Dichloropropane and Dichloropropene.* (October, 1980)
EPA 440-5-80-044	U.S. EPA, *Ambient Water Quality Criteria for 2,4-Dimethylphenol.* (October, 1980)
EPA 440-5-80-046	U.S. EPA, *Ambient Water Quality Criteria for Endosulfan.* (October, 1980)
EPA 440-5-80-047	U.S. EPA, *Ambient Water Quality Criteria for Endrin.* (October, 1980)
EPA 440-5-80-048	U.S. EPA, *Ambient Water Quality Criteria for Ethylbenzene.* (October, 1980)
EPA 440-5-80-049	U.S. EPA, *Ambient Water Quality Criteria for Fluoranthene.* (October, 1980)
EPA 440-5-80-051	U.S. EPA, *Ambient Water Quality Criteria for Halomethanes.* (October, 1980)
EPA 440-5-80-052	U.S. EPA, *Ambient Water Quality Criteria for Heptachlor.* (October, 1980)
EPA 440-5-80-054	U.S. EPA, *Ambient Water Quality Criteria for Hexachlorocyclohexane.* (October, 1980)
EPA 440-5-80-055	U.S. EPA, *Ambient Water Quality Criteria for Hexachlorocyclopentadiene.* (October, 1980)
EPA 440-5-80-058	U.S. EPA, *Ambient Water Quality Criteria for Mercury.* (October, 1980)

NUMERIC REFERENCE	***FULL CITATION***
EPA 440-5-80-060	U.S. EPA, *Ambient Water Quality Criteria for Nickel.* (October, 1980)
EPA 440-5-80-061	U.S. EPA, *Ambient Water Quality Criteria for Nitrobenzene.* (October, 1980)
EPA 440-5-80-063	U.S. EPA, *Ambient Water Quality Criteria for Nitrophenols.* (October, 1980)
EPA 440-5-80-066	U.S. EPA, *Ambient Water Quality Criteria for Phenol.* (October, 1980)
EPA 440-5-80-067	U.S. EPA, *Ambient Water Quality Criteria for Phthalate Esters.* (October, 1980)
EPA 440-5-80-068	U.S. EPA, *Ambient Water Quality Criteria for Polychlorinated Biphenyls.* (October, 1980)
EPA 440-5-80-069	U.S. EPA, *Ambient Water Quality Criteria for Polynuclear Aromatic Hydrocarbons.* (October, 1980)
EPA 440-5-80-071	U.S. EPA, *Ambient Water Quality Criteria for Silver.* (October, 1980)
EPA 440-5-80-074	U.S. EPA, *Ambient Water Quality Criteria for Thallium.* (October, 1980)
EPA 440-5-80-075	U.S. EPA, *Ambient Water Quality Criteria for Toluene.* (October, 1980)
EPA 440-5-84-026	U.S. EPA, *Ambient Water Quality Criteria for Mercury.* (October, 1980)
EPA 440-5-84-027	U.S. EPA, *Ambient Water Quality Criteria for Lead.* (October, 1980)
EPA 440-5-84-028	U.S. EPA, *Ambient Water Quality Criteria for Cyanide.* (October, 1980)
EPA 440-5-84-029	U.S. EPA, *Ambient Water Quality Criteria for Chromium.* (October, 1980)
EPA 440-5-84-030	U.S. EPA, *Ambient Water Quality Criteria for Chlorine.* (October, 1980)
EPA 440-5-84-031	U.S. EPA, *Ambient Water Quality Criteria for Copper.* (October, 1980)
EPA 440-5-84-033	U.S. EPA, *Ambient Water Quality Criteria for Arsenic.* (October, 1980)
EPA 440-5-86-001	U.S. EPA, *Quality Criteria for Water 1986.* (May 1, 1986) Also referred to as the "Gold Book."
EPA 440-5-86-004	U.S. EPA, *Ambient Water Quality Criteria for Nickel.* (September, 1986)
EPA 440-5-86-005	U.S. EPA, *Ambient Water Quality Criteria for Chloropyrifos.* (September, 1986)
EPA 440-5-86-006	U.S. EPA, *Ambient Water Quality Criteria for Toxaphene.* (September, 1986)
EPA 440-5-86-008	U.S. EPA, *Ambient Water Quality Criteria for Aluminum.* (August, 1988)
EPA 440-5-86-009	U.S. EPA, *Ambient Water Quality Criteria for Pentachlorophenol.* (September, 1986)
EPA 440-5-87-003	U.S. EPA, *Ambient Water Quality Criteria for Zinc.* (February, 1987)
EPA 440-5-87-006	U.S. EPA, *Ambient Water Quality Criteria for Selenium.* (September, 1987)
EPA 440-5-88-001	U.S. EPA, *Ambient Water Quality Criteria for Chloride.* (February, 1988)
EPA 440-5-88-004	U.S. EPA, *Ambient Water Quality Criteria for Ammonia (Saltwater).* (April, 1989)
EPA-440-9-76-023	U.S. EPA, *Quality Criteria for Water.* (July 26, 1976) Also referred to as the "Red Book."
EPA 820-B-96-001	U.S. EPA, *1995 Updates: Water Quality Criteria Documents for the Protection of Aquatic Life in Ambient Water.* (September, 1996)

NUMERIC REFERENCE	***FULL CITATION***
EPA 822-D-97-001	U.S. EPA, *Ambient Aquatic Life Water Quality Criteria: Tributyltin - Draft.* (July, 1997)
EPA 822-R-99-014	U.S. EPA, *1999 Update of Ambient Water Quality Criteria for Ammonia.* (December, 1999)
EPA 822-R-01-001	U.S. EPA, *2001 Update of Ambient Water Quality Criteria for Cadmium.* (April, 2001)
EPA 822-R-03-031	U.S. EPA, *Ambient Aquatic Life Water Quality Criteria for Tributyltin (TBT) - Final.* (December, 2003)
EPA 822-Z-99-001	U.S. EPA, *National Recommended Water Quality Criteria - Correction.* (April 1999)
EPA R3-73-033	U.S. EPA, *Water quality criteria.* (1972) Also referred to as the "Blue Book."
EPA PB-216 740	U.S. EPA, *Water quality criteria: report of the National Technical Advisory Committee to the Secretary of the Interior.* (1968) Also referred to as the "Green Book."
EPA NRWQC 2006	U.S. EPA, *National Recommended Water Quality Criteria.* (January, 2006, and Last updated on Wednesday, July 18th, 2007) http://www.epa.gov/waterscience/criteria/nrwqc-2006.pdf

ENDNOTES

[1] Criteria in this table were obtained from ADEC, *Alaska Drinking Water Regulations*, as amended through November 9th, 2006 in 18 AAC 80.300(b). The drinking water primary maximum contaminant levels are used as water quality criteria to protect the drinking water and contact recreation uses. The criteria for metals will be measured using the total method that is consistent with drinking water regulations measurement protocol.

[2] Criteria in this column were obtained from the *Report of the Committee on Water Quality Criteria*, (also known as the Green Book), 1968, Federal Water Pollution Control Administration, p. 135, Table IV-11.

[3] Criteria in this column were obtained from *Water Quality Criteria*, (also known as the Blue Book), 1972, National Academy of Sciences, National Academy of Engineering, Washington, D.C., p. 339, Table V-13.

[4] References are shown so the user can look up information on the criteria. These documents are not adopted by reference. Not all referenced documents include current criteria values. Some present useful information about the toxic effects caused by the pollutant, and/or derivation and scientific basis of criteria for this pollutant.

[5] This criterion has been revised to reflect the Environmental Protection Agency's q1* or RfD, as contained in the Integrated Risk Information System (IRIS) as of April 8, 1998. The fish tissue bioconcentration factor (BCF) from the 1980 Ambient Water Quality Criteria document was retained in each case.

[6] The acute criterion is to be met instantaneously at any point in the surface water.

[7] These criteria are based on 304(a) aquatic life criterion issued in 1980, and was issued in one of the following documents: Aldrin/Dieldrin (EPA 440/5-80-019), Chlordane (EPA 440/5-80-027), DDT (EPA 440/5-80-038), Endosulfan (EPA 440/5-80-046), Endrin (EPA 440/5-80-047), Heptachlor (EPA 440/5-80-052), Hexachlorocyclohexane (EPA 440/5-80-054), Silver (EPA 440/5-80-071). The Minimum Data Requirements and derivation procedures were different in the 1980 Guidelines than in the 1985 Guidelines. For example, a CMC derived using the 1980 Guidelines was derived to be used as an instantaneous maximum. If assessment is to be done using an averaging period, the values given should be divided by 2 to obtain a value that is more comparable to a CMC derived using the 1985 Guidelines.

[8] Alkalinity is the sum total of components in the water that tend to elevate the pH of the water above about 4.5. It is measured by titration with standardized acid to a pH value of about 4.5 and it is expressed commonly as milligrams per liter of CaCO3. Alkalinity is a measure of the buffering capacity of the water, and since pH has a direct effect on organisms as well as an indirect effect on the toxicity of some pollutants in the water, it is important to water quality.

[9] These criteria were derived from data for endosulfan and are most appropriately applied to the sum of alpha-endosulfan and beta-endosulfan.

[10] The 24-hour average is to be applied as an average concentration and not as a criterion to be met instantaneously at any point in the surface water.

[11] Acute criteria are based on the average concentration of chemical pollutants during a one-hour period. One hour was chosen because it is a substantially shorter period than the length of most acute toxicity tests. Acute and chronic criteria are used together to develop water quality-based effluent limits.

[12] Chronic criteria are based on the average concentration of chemical pollutants during a four-day period. A four-day averaging period was chosen because it is substantially shorter than most chronic toxicity tests. Chronic criteria are typically stricter than the acute criteria and are therefore used to protect ambient waters.

[13] Where the pH is greater than or equal to 7.0 *and* the hardness is greater than or equal to 50 ppm as $CaCO_3$, the chronic aluminum standard will then be equal to the acute aluminum standard, 750 µg/L as total recoverable aluminum.

[14] There are three major reasons why the use of Water-Effect Ratios might be appropriate. (1) The value of 87 µg/l is based on a toxicity test with the striped bass in water with pH= 6.5-6.6 and hardness <10 mg/L. Data in "Aluminum Water-Effect Ratio for the 3M Plant Effluent Discharge, Middleway, West Virginia" (May 1994) indicate that aluminum is substantially less toxic at higher pH and hardness, but the effects of pH and hardness are not well quantified at this time. (2) In tests with the brook trout at low pH and hardness, effects increased with increasing concentrations of total aluminum even though the concentration of dissolved aluminum was constant, indicating that total recoverable is a more appropriate measurement than dissolved, at least when particulate aluminum is primarily aluminum hydroxide particles. In surface waters, however, the total recoverable procedure might measure aluminum associated with clay particles, which might be less toxic than aluminum associated with aluminum hydroxide. (3) EPA is aware of field data indicating that many high quality waters in the U.S. contain more than 87 µg aluminum/L, when either total recoverable or dissolved is measured.

[15] The highest four-day average within the 30-day period should not exceed 2.5 times the chronic criterion.

[16] Because sensitive saltwater animals appear to have a narrow range of acute susceptibilities to ammonia, this criterion will probably be as protective as intended only when the magnitudes or durations of excursions are appropriately small.

[17] With compliance to be reported as required under 18 AAC 80.305(b)(4)

[18] To calculate the dissolved criterion, the total recoverable criterion was multiplied by the conversion factor (339.8)(1.0) = 339.8 ~ 340

[19] This recommended water quality criterion was derived from data for arsenic (III), but is applied here to total arsenic, which might imply that arsenic (III) and arsenic (V) are equally toxic to aquatic life and that their toxicities are additive. In the arsenic criteria document (EPA 440-5-84-033, January 1985), Species Mean Acute Values are given for both arsenic (III) and arsenic (V) for five species and the ratios of the SMAVs for each species range from 0.6 to 1.7. Chronic values are available for both arsenic (III) and arsenic (V) for one species; for the fathead minnow, the chronic value for arsenic (V) is 0.29 times the chronic value for arsenic (III). No data are known to be available concerning whether the toxicities of the forms of arsenic to aquatic organisms are additive.

[20] This recommended criterion is based on a 304(a) aquatic life criterion that was issued in the *1995 Updates: Water Quality Criteria Documents for the Protection of Aquatic Life in Ambient Water*, (EPA-820-B-96-001, September 1996). This value was derived using the GLI Guidelines (60FR15393-15399, March 23, 1995; 40CFR132 Appendix A); the difference between the 1985 Guidelines and the GLI Guidelines are explained on page iv of the 1995 Updates. None of the decisions concerning the derivation of this criterion were affected by any considerations that are specific to the Great Lakes. **Alternatively, the copper Biotic Ligand Model (BLM) (EPA-822-R-07-001, February 2007), which is hereby adopted by reference, may be used as an alternative to the method outlined in the 1995 updates. The department will implement the BLM-derived criteria outlined in the *Implementation of the Biotic Ligand Model for Derivation of Freshwater Aquatic Life Criteria for Copper on a Site-Specific Basis in State Water Quality Standards* (2025), which is hereby adopted by reference. This document is available through the department website.**

[21] To calculate the dissolved criterion, the total recoverable criterion was multiplied by the conversion factor (147.9)(1.0) = 147.9 ~ 150

[22] To calculate the dissolved criterion, the total recoverable criterion was multiplied by the conversion factor (68.55)(1.0) = 68.55 ~ 69

[23] To calculate the dissolved criterion, the total recoverable criterion was multiplied by the conversion factor (36.05)(1.0) = 36.05 ~ 36

[24] Although EPA has not published a completed criteria document for butylbenzyl phthalate it is EPA's understanding that sufficient data exist to allow calculation of aquatic criteria. It is anticipated that industry intends to publish in the peer reviewed literature draft aquatic life criteria generated in accordance with EPA Guidelines. EPA will review such criteria for possible issuance as national WQC.

[25] For waters with a hardness of less than 25 mg/l as CaCO3, criteria should be calculated using the actual ambient hardness of the surface water. The maximum hardness value shall not exceed 400 mg/l even if the actual ambient hardness is greater than 400 mg/l as calcium carbonate.

[26] The limited data suggest that the acute toxicity of cadmium is salinity-dependent; therefore the 24-hour average concentration might be under protective at low salinities and overprotective at high salinities.

[27] To calculate the dissolved criterion, multiply the total recoverable criterion by the conversion factor (40.28)(0.994) = 40.04 ~ 40

[28] To calculate the dissolved criterion, multiply the total recoverable criterion by the conversion factor (8.846)(0.994) = 8.793 ~ 8.8

[29] This criterion is based on a 304(a) aquatic life criterion issued in 1980 or 1986, and was issued in one of the following documents: Aldrin/Dieldrin (EPA 440/5-80-019), Chlordane (EPA 440/5-80-027), DDT (EPA 440/5-80-038), Endrin (EPA 440/5-80-047), Heptachlor (EPA 440/5-80-052), Polychlorinated biphenyls (EPA 440/5-80-068), Toxaphene (EPA 440/5-86-006). This CCC is currently based on the Final Residue Value (FRV) procedure. Since the publication of the Great Lakes Aquatic Life Criteria Guidelines in 1995 (60FR15393-15399, March 23, 1995),

the Agency no longer uses the Final Residue Value procedure for deriving CCCs for new or revised 304(a) aquatic life criteria. Therefore, the EPA anticipates that future revisions of this CCC will not be based on the FRV procedure.

[30] This criterion may not be adequately protective when the chloride is associated with potassium, calcium, or magnesium. Also, because freshwater animals have a narrow range of acute susceptibilities to chloride, excursions above this criterion might affect a substantial number of species.

[31] This value is based on a 304(a) aquatic life criterion that was derived using the 1985 Guidelines (*Guidelines for Deriving Numerical National Water Quality Criteria for the Protection of Aquatic Organisms and Their Uses*, PB85-227049, January 1985) and was issued in one of the following criteria documents: Aluminum (EPA 440/5-86-008); Chloride (EPA 440/5-88-001); Chloropyrifos (EPA 440/5-86-005).

[32] No criterion for protection of human health from consumption of aquatic organisms excluding water was presented in the 1980 criteria document or in the 1986 Quality Criteria for Water. Nevertheless, sufficient information was presented in the 1980 document to allow the calculation of a criterion, even though the results of such a calculation were not shown in the document.

[33] To calculate the dissolved criterion, the total recoverable criterion was multiplied by the conversion factor (16.02)(0.982) = 15.73 ~ 16

[34] To calculate the dissolved criterion, the total recoverable criterion was multiplied by the conversion factor (10.98)(0.962) = 10.56 ~ 11

[35] Data suggest that the acute toxicity of chromium VI is salinity-dependent; therefore the one-hour average concentration might be under protective at low salinities.

[36] To calculate the dissolved criterion, multiply the total recoverable criterion by the conversion factor (1079)(0.993) = 1071.45 ~ 1100

[37] To calculate the dissolved criterion, multiply the total recoverable criterion by the conversion factor (49.86)(0.993) = 49.51 ~ 50

[38] When the concentration of dissolved organic carbon is elevated, copper is substantially less toxic and use of site specific criteria might be appropriate.

[39] Conversion factors for saltwater chronic criterion are not currently available. The conversion factor of 0.83 derived for the saltwater acute criterion has been used for both saltwater acute and chronic criteria.

[40] The aquatic life criteria for free cyanide shall be measured as weak acid dissociable (WAD) cyanide or equivalent approved EPA methods.

[41] This water quality criterion is based on a 304(a) aquatic life criterion that was derived using the 1985 Guidelines (*Guidelines for Deriving Numerical National Water Quality Criteria for the Protection of Aquatic Organisms and Their Uses*, PB85-227049, January 1985) and was issued in one of the following criteria documents: Arsenic (EPA 440/5-84-033), Cadmium (EPA-822-R-01-001), Chromium (EPA 440/5-84-029), Copper (EPA 440/5-84-031), Cyanide (EPA 440/5-84-028), Lead (EPA 440/5-84-027), Nickel (EPA 440/5-86-004), Pentachlorophenol (EPA 440/5-86-009), Toxaphene, (EPA 440/5-86-006), Zinc (EPA 440/5-87- 003).

[42] This criterion applies to DDT and its metabolites (i.e., the total concentration of DDT and its metabolites should not exceed this value).

[43] The derivation of the chronic criterion for endrin and dieldrin did not consider exposure through the diet, which is probably important for aquatic life occupying upper trophic levels.

[44] The derivation of the CCC for this pollutant (Endrin) did not consider exposure through the diet, which is probably important for aquatic life occupying upper trophic levels.

[45] Including radium-226 but excluding activity from radon and uranium.

[46] These criteria were derived from data for heptachlor, and the 1980 criteria document provides insufficient data to estimate the relative toxicities of heptachlor and heptachlor epoxide.

[47] EPA is actively working on this criterion and so this recommended water quality criterion may change substantially in the near future.

[48] To calculate the dissolved criterion, multiply the total recoverable criterion by the conversion factor (217.16)(0.951) = 206.519 ~ 210

[49] To calculate the dissolved criterion, multiply the total recoverable criterion by the conversion factor (8.468)(0.951) = 8.053 ~ 8.1

[50] This human health criterion is the same as originally published in the Red Book which predates the 1980 methodology and did not use the fish ingestion BCF approach.

[51] To calculate the dissolved criterion, the total recoverable criterion was multiplied by the conversion factor (1.694)(0.85) = 1.4399 ~ 1.4

[52] The recommended criteria were derived from data for inorganic mercury (II), but are applied here to total mercury. If a substantial portion of the mercury in the water column is methylmercury, the criteria will probably be under protective. In addition, even though inorganic mercury is converted to methylmercury and methylmercury bioaccumulates to a great extent, these criteria do not account for uptake via the food chain because sufficient data were not available when the criteria were derived.

[53] To calculate the dissolved criterion, the total recoverable criterion was multiplied by the conversion factor (0.9081)(0.85) = 0.771 ~ 0.77. The concentration of 0.9081 µg/l mighty not adequately protect rainbow trout, coho salmon and bluegill.

[54] To calculate the dissolved criterion, multiply the total recoverable criterion by the conversion factor (2.062)(0.85) = 1.752 ~ 1.8

[55] This recommended water quality criterion was derived on page 43 of the mercury criteria document (EPA 440/5-84-026, January 1985). The saltwater CCC of 0.025 µg/L given on page 23 of the criteria document is based on the Final Residue Value procedure in the 1985 Guidelines. Since the publication of the Great Lakes Aquatic Life Criteria Guidelines in 1995 (60FR15393-15399, March 23, 1995), the EPA no longer uses the Final Residue Value procedure for deriving CCCs for new or revised 304(a) aquatic life criteria.

[56] To calculate the dissolved criterion, multiply the total recoverable criterion by the conversion factor (1.106)(0.85) = 0.9401 ~ 0.94

[57] None, but monitoring requirements under this chapter apply.

[58] To calculate the dissolved criterion, multiply the total recoverable criterion by the conversion factor (74.60)(0.990) = 73.854 ~ 74

[59] To calculate the dissolved criterion, multiply the total recoverable criterion by the conversion factor (8.293)(0.990) = 8.21 ~ 8.2

[60] This value is based on a 304(a) aquatic life criterion that was issued in the *1995 Updates: Water Quality Criteria Documents for the Protection of Aquatic Life in Ambient Water* (EPA-820-B-96-001). This value was derived using the GLI Guidelines (60FR15393-15399, March 23, 1995; 40CFR132 Appendix A); the differences between the 1985 Guidelines and the GLI Guidelines are explained on page iv of the 1995 Updates. No decision concerning this criterion was affected by any considerations that are specific to the Great Lakes.

[61] According to page 181 of the Red Book: For open ocean waters where the depth is substantially greater than the euphotic zone, the pH should not be changed more than 0.2 units from the naturally occurring variation or any case outside the range of 6.5 to 8.5. For shallow, highly productive coastal and estuarine areas where naturally occurring pH variations approach the lethal limits of some species, changes in pH should be avoided but in any case should not exceed the limits established for fresh water, i.e., 6.5-9.0.

[62] This criterion applies to total PCBs, (e.g., the sum of all congener or all isomer or homolog or Aroclor analyses.). PCBs are a class of chemicals that include aroclors, 1242, 1254, 1221, 1232, 1248, 1260, and 1016. The aquatic life criteria apply to this set of PCBs.

[63] The CMC = 1/[(f1/CMC1) + (f2/CMC2)] where f1 and f2 are the fractions of total selenium that are treated as selenite and selenate, respectively, and CMC1 and CMC2 are 185.9 µg/l and 12.82 µg/l, respectively.

[64] This value for selenium was announced (61FR58444-58449, November 14, 1996) as a proposed GLI 303(c) aquatic life criterion. EPA is currently working on this criterion and so this value might change substantially in the near future.

[65] This recommended water quality criterion for selenium is expressed in terms of total recoverable metal in the water column. It is scientifically acceptable to use the conversion factor (0.996-CMC or 0.922- CCC) that was used in the GLI to convert this to a value that is expressed in terms of dissolved metal.

[66] The selenium criteria document (EPA 440/5-87-006, September 1987) provides that if selenium is as toxic to saltwater fishes in the field as it is to freshwater fishes in the field, the status of the fish community should be monitored whenever the concentration of selenium exceeds 5.0 g/L in salt water because the saltwater CCC does not take into account uptake via the food chain.

[67] To calculate the acute dissolved criterion, multiply the total recoverable criterion by the conversion factor (293.8)(0.998) = 293.21 ~ 290.

[68] To calculate the chronic dissolved criterion, multiply the total recoverable criterion by the conversion factor (71.14)(0.998) = 70.99 ~ 71.

[69] To calculate the dissolved criterion, multiply the total recoverable criterion by the conversion factor (2.3)(0.85) = 1.955 ~ 1.9

[70] TTHMs are the sum of the concentrations of bromodichloromethane, dibromochloromethane, tribromomethane (bromoform), and trichloromethane (chloroform). The definition of TTHMs were obtained from ADEC, *Alaska Drinking Water Regulations,* as amended through November 9th, 2006 in 18 AAC 80.305 (d).

[71] EPA announced the availability of a draft updated tributyltin (TBT) document on August 7, 1997 (62FR42554). The Agency has reevaluated this document and anticipates releasing an updated document for public comment in the near future.

[72] To calculate the dissolved criterion, multiply the total recoverable criterion by the conversion factor (95.10)(0.946) = 89.96 ~ 90

[73] To calculate the dissolved criterion, multiply the total recoverable criterion by the conversion factor (86.14)(0.946) = 81.49 ~ 81

[74] Freshwater and saltwater criteria for metals are expressed in terms of the dissolved metal in the water column. The recommended water quality criteria value was calculated by using the previous 304(a) aquatic life criteria expressed in terms of total recoverable metal, and multiplying it by a conversion factor (CF). The term "Conversion Factor" (CF) represents the recommended conversion factor for converting a metal criterion expressed as the total recoverable fraction in the water column to a criterion expressed as the dissolved fraction in the water column. (Conversion Factors for saltwater CCCs are not currently available. Conversion factors derived for saltwater CMCs have been used for both saltwater CMCs and CCCs).

[75] 1999 Update of Ambient Water Quality Criteria for Ammonia, EPA 822-R-99-014

[76] At 15 C and above, the criterion for when the early life stages of fish are absent is the same as the criterion for when the early life stages of fish are present.

[77] Because sensitive saltwater animals appear to have a narrow range of acute susceptibilities to ammonia, this criterion will probably be as protective as intended only when the magnitudes and/or durations of excursions are appropriately small.

[78] These values were calculated by Hampson's (1977) program and Whitfield's (1974) model for hydrolysis of ammonium ions in sea water cited in EPA, 1989, *Ambient Water Quality Criteria for Ammonia (Saltwater)-1989*, EPA 440-5-88-004. See below for actual references:

- Hampson, B.L., 1977, Relationship Between Total Ammonia and Free Ammonia in Terrestrial and Ocean Waters, J Cons. Int. Expl. Mer 37(2): 117-122.
- Whitfield, M., 1974, The Hydrolysis of Ammonium Ions in Sea Water – A Theoretical Study, J. Mar. Biol. Assoc. U.K. 54:565-580.