**TABLE 30: Aquatic Life Water Quality Criteria for Toxic Pollutants**

*Effective [EPA Approval XXXXXX]*

**Aquatic Life Criteria Summary**

The concentration for each compound listed in Table 30 is a criterion not to be exceeded in waters of the state in order to protect aquatic life. The aquatic life criteria apply to waterbodies where the protection of fish and aquatic life are the designated uses. All values are expressed as micrograms per liter (µg/L). Compounds are listed in alphabetical order with the corresponding information: the Chemical Abstract Service (CAS) number, whether there is a human health criterion for the pollutant (i.e. “y”= yes, “n” = no), and the associated aquatic life freshwater and saltwater acute and chronic criteria. Italicized pollutants are not identified as priority pollutants by EPA. Dashes in the table column indicate that there is no aquatic life criterion.

Unless otherwise noted in the table below, the acute criterion is the Criterion Maximum Concentration (CMC) applied as a one-hour average concentration, and the chronic criterion is the Criterion Continuous Concentration (CCC) applied as a 96-hour (4 days) average concentration. The CMC and CCC criteria should not be exceeded more than once every three years. Footnote A, associated with eleven pesticide pollutants in Table 30, describes the exception to the frequency and duration of the toxics criteria stated in this paragraph.

| Table 30**Aquatic Life Water Quality Criteria for Toxic Pollutants** |
| --- |
|  | **Pollutant** | **CAS No.** | **Human Health Criterion**  | **Freshwater**  **(*µg/L)*** | **Saltwater*****(µg/L)***  |
| **Acute Criterion (CMC)** | **Chronic Criterion (CCC)** | **Acute Criterion (CMC)** | **Chronic Criterion (CCC)** |
| 1 | Aldrin | 309002 | y | 3 **A** | -- | 1.3 **A** | -- |
| ***A*** *See expanded footnote A at bottom of Table 30 for alternate frequency and duration of this criterion.* |
| 2 | *Alkalinity* |  | n | -- | 20,000 **B** | -- | -- |
| **B** *Criterion shown is the minimum (i.e. CCC in water may not be below this value in order to protect aquatic life).* |
| 3 | *Ammonia* | 7664417 | n | *Criteria are pH, temperature, and salmonid or sensitive cold water species dependent--See document USEPA January 1985 (Fresh Water).***M**  | *Ammonia criteria for saltwater may depend on pH and temperature. Values for saltwater criteria (total ammonia) can be calculated from the tables specified in Ambient Water Quality Criteria for Ammonia (Saltwater)--1989 (EPA 440/5-88-004;*[*http://water.epa.gov/scitech/swguidance/standards/criteria/current/index.cfm*](http://water.epa.gov/scitech/swguidance/standards/criteria/current/index.cfm) |
| [**M** See expanded footnote M equations at bottom of Table 30 to calculate freshwater ammonia criteria](#_top) |
| 4 | Arsenic  | 7440382 | y | 340 **C, D** | 150 **C, D** | 69 **C, D** | 36 **C, D** |
| **C** *Criterion is expressed in terms of “dissolved” concentrations in the water column.***D** *Criterion is applied as total arsenic (i.e. arsenic (III) + arsenic (V)).*  |
| 5 | BHC Gamma (Lindane) | 58899 | y | 0.95 | 0.08 **A** | 0.16 **A** | -- |
| ***A*** *See expanded footnote A at bottom of Table 30 for alternate frequency and duration of this criterion.* |
| 6 | Cadmium | 7440439 | n | *See* **E** | *See* **C,**  **F** | 40 **C** | 8.8 **C** |
| **C** *Criterion is expressed in terms of “dissolved” concentrations in the water column.***E** *The freshwater criterion for this metal is expressed as a function of hardness (mg/L) in the water column. To calculate the criterion, use formula under expanded Footnote E at bottom of Table 30.*  **F** *The freshwater criterion for this metal is expressed as a function of hardness (mg/L) in the water column. To calculate the criterion, use formula under expanded Footnote F at bottom of Table 30.* |
| 7 | Chlordane | 57749 | y | 2.4**A** | 0.0043**A** | 0.09**A** | 0.004**A** |
| ***A*** *See expanded footnote A at bottom of Table 30 for alternate frequency and duration of this criterion.* |
| 8 | *Chloride* | 16887006 | n | 860,000 | 230,000 | -- | -- |
| 9 | *Chlorine* | 7782505 | n | 19 | 11 | 13 | 7.5 |
| 10 | *Chlorpyrifos* | 2921882 | n | 0.083 | 0.041 | 0.011 | 0.0056 |
| 11 | Chromium VI  | 18540299 | n | 16 **C** | 11 **C** | 1100**C** | 50**C** |
| **C** *Criterion is expressed in terms of “dissolved” concentrations in the water column.*  |
| 12 | Chromium III  | 16065831 | n | *See* **C,** **F** | *See* **C,** **F** | -- | -- |
| **C** *Criterion is expressed in terms of “dissolved” concentrations in the water column.* **F** *The freshwater criterion for this metal is expressed as a function of hardness (mg/L) in the water column. To calculate the criterion, use formula under expanded Footnote F at bottom of Table 30.* |
| 13 | Copper | 7440508 | y | *See* **E** | *See* **E** | 4.8 **C** | 3.1 **C** |
| **C** *Criterion is expressed in terms of “dissolved” concentrations in the water column.***E** *The freshwater criterion for this metal is expressed as a function of hardness (mg/L) in the water column. To calculate the criterion, use formula under expanded Footnote E at bottom of Table 30.*  |
| 14 | Cyanide | 57125 | y | 22 **J** | 5.2 **J** | 1 **J** | 1 **J** |
| **J** This criterion is expressed as µg free cyanide (CN)/L. |
| 15 | DDT 4,4' | 50293 | y | 1.1 **A , G** | 0.001 **A, G** | 0.13 **A, G** | 0.001 **A, G** |
| ***A*** *See expanded footnote A at bottom of Table 30 for alternate frequency and duration of this criterion.***G** *This criterion applies to DDT and its metabolites (i.e. the total concentration of DDT and its metabolites should not exceed this value).* |
| 16 | *Demeton* | 8065483 | n | -- | 0.1 | -- | 0.1 |
| 17 | Dieldrin | 60571 | y | 0.24 | 0.056 | 0.71 **A** | 0.0019 **A** |
| ***A*** *See expanded footnote A at bottom of Table 30 for alternate frequency and duration of this criterion.* |
| 18 | Endosulfan | 115297 | n | 0.22 **A , H**  | 0.056 **A , H**  | 0.034 **A , H**  | 0.0087 **A, H**  |
| ***A*** *See expanded footnote A at bottom of Table 30 for alternate frequency and duration of this criterion.***H** *This value is based on* *the* *criterion published in Ambient Water Quality Criteria for Endosulfan (EPA 440/5-80-046) and should be applied as the sum of alpha- and beta-endosulfan.* |
| 19 | Endosulfan Alpha | 959988 | y | 0.22 **A** | 0.056 **A** | 0.034 **A** | 0.0087 **A** |
| ***A*** *See expanded footnote A at bottom of Table 30 for alternate frequency and duration of this criterion.* |
| 20 | Endosulfan Beta | 33213659 | y | 0.22 **A** | 0.056 **A** | 0.034 **A** | 0.0087 **A** |
| ***A*** *See expanded footnote A at bottom of Table 30 for alternate frequency and duration of this criterion.* |
| 21 | Endrin | 72208 | y | 0.086 | 0.036 | 0.037 **A** | 0.0023 **A** |
| ***A*** *See expanded footnote A at bottom of Table 30 for alternate frequency and duration of this criterion.* |
| 22 | *Guthion* | 86500 | n | -- | 0.01 | -- | 0.01 |
| 23 | Heptachlor | 76448 | y | 0.52 **A** | 0.0038 **A** | 0.053 **A** | 0.0036 **A** |
| ***A*** *See expanded footnote A at bottom of Table 30 for alternate frequency and duration of this criterion.* |
| 24 | Heptachlor Epoxide | 1024573 | y | 0.52 **A** | 0.0038 **A** | 0.053 **A** | 0.0036 **A** |
| ***A*** *See expanded footnote A at bottom of Table 30 for alternate frequency and duration of this criterion.* |
| 25 | *Iron (total)* | 7439896 | n | -- | 1000 | -- | -- |
| 26 | Lead | 7439921 | n | *See* **C , F**  | *See* **C , F**  | 210 **C** | 8.1 **C**  |
| **C** *Criterion is expressed in terms of “dissolved” concentrations in the water column.***F** *The freshwater criterion for this metal is expressed as a function of hardness (mg/L) in the water column. To calculate the criterion, use formula under expanded Footnote F at bottom of Table 30.* |
| 27 | *Malathion* | 121755 | n | -- | 0.1 | -- | 0.1 |
| 28 | Mercury (total) | 7439976 | n | 2.4 | 0.012 | 2.1 | 0.025 |
| 29 | *Methoxychlor* | 72435 | y | -- | 0.03 | -- | 0.03 |
| 30 | *Mirex* | 2385855 | n | -- | 0.001 | -- | 0.001 |
| 31 | Nickel | 7440020 | y | *See* **C , F** | *See* **C , F** | 74 **C**  | 8.2 **C** |
| **C** *Criterion is expressed in terms of “dissolved” concentrations in the water column.* **F** *The freshwater criterion for this metal is expressed as a function of hardness (mg/L) in the water column. To calculate the criterion, use formula under expanded Footnote F at bottom of Table 30.* |
| 32 | *Parathion* | 56382 | n | 0.065 | 0.013 | -- | -- |
| 33 | Pentachlorophenol | 87865 | y | *See* **H** | *See* **H**  | 13 | 7.9  |
| **H** *Freshwater aquatic life values for pentachlorophenol are expressed as a function of pH, and are calculated as follows: CMC=(exp(1.005(pH)-4.869); CCC=exp(1.005(pH)-5.134).* |
| 34 | *Phosphorus Elemental* | 7723140 | n | -- | -- | -- | 0.1 |
| 35 | Polychlorinated Biphenyls (PCBs) | NA  | y | 2 **K** | 0.014 **K** | 10 **K** | 0.03 **K** |
| **K** *This criterion applies to total PCBs (e.g.* determined as Aroclors or congeners) |
| 36 | Selenium | 7782492 | y | *See* **C** , **L**  |  4.6 **C** | 290 **C** | 71 **C** |
| **C** *Criterion is expressed in terms of “dissolved” concentrations in the water column.***L** *The CMC=(1/[(f1/CMC1)+(f2/CMC2)]µg/L)\*CF, 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. See expanded footnote F for the Conversion Factor (CF) for selenium.* |
| 37 | Silver | 7440224 | n | *See* **C** , **F** | 0.10 **C**  | 1.9 **C**   | -- |
| **C** *Criterion is expressed in terms of “dissolved” concentrations in the water column.* **F** *The freshwater acute criterion for this metal is expressed as a function of hardness (mg/L) in the water column. To calculate the criterion, use formula under expanded Footnote F at bottom of Table 30.* |
| 38 | *Sulfide Hydrogen Sulfide* | 7783064 | n | -- | 2 | -- | 2 |
| 39 | Toxaphene | 8001352 | y | 0.73 | 0.0002 | 0.21 | 0.0002 |
| 40 | *Tributyltin (TBT)* | 688733 | n | 0.46 | 0.063  | 0.37  | 0.01  |
| 41 | Zinc | 7440666 | y | *See* **C , F** | *See* **C , F**  | 90 **C**  | 81 **C**  |
| **C** *Criterion is expressed in terms of “dissolved” concentrations in the water column.***F** *The freshwater criterion for this metal is expressed as a function of hardness (mg/L) in the water column. To calculate the criterion, use formula under expanded Footnote F at bottom of Table 30.* |

**Expanded Footnotes A, E, F, M**

**Footnote A: Alternate Frequency and Duration for Certain Pesticides**

This criterion is based on EPA recommendations issued in 1980 that were derived using guidelines that differed from EPA's 1985 Guidelines which update minimum data requirements and derivation procedures. The CMC should not be exceeded at any time and the CCC should not be exceeded based on a 24-hour average. The CMC may be applied using a one-hour averaging period not to be exceeded more than once every three years, if the CMC values given in Table 30 are divided by 2 to obtain a value that is more comparable to a CMC derived using the 1985 Guidelines.

**Footnote E: Equations for Hardness-Dependent Freshwater Metals Criteria for Cadmium Acute and Copper Acute and Chronic Criteria**

The freshwater criterion for this metal is expressed as total recoverable with two significant figures, and is a function of hardness (mg/L) in the water column. Criteria values for hardness may be calculated from the following formulas (CMC refers to the acute criterion; CCC refers to the chronic criterion):

**CMC** = (exp(mA\*[ln(hardness)] + bA))

**CCC** = (exp(mC\*[ln(hardness)] + bC))

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Chemical** | **mA** | **bA** | **mC** | **bC** |
| Cadmium | 1.128 | -3.828 | N/A | N/A |
| Copper | 0.9422 | -1.464 | 0.8545 | -1.465 |

**Footnote F: Equations for Hardness-Dependent Freshwater Metals Criteria and Conversion Factor Table**

The freshwater criterion for this metal is expressed as dissolved with two significant figures, and is a function of hardness (mg/L) in the water column. Criteria values for hardness may be calculated from the following formulas (CMC refers to the acute criterion; CCC refers to the chronic criterion):

 **CMC** = (exp(mA\*[ln(hardness)] + bA))\*CF

 **CCC** = (exp(mC\*[ln(hardness)] + bC))\*CF

 “CF” is the conversion factor used 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.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Chemical** | **mA** | **bA** | **mC** | **bC** |
| Cadmium |  N/A |  N/A | 0.7409 | -4.719 |
| Chromium III | 0.8190 | 3.7256 | 0.8190 | 0.6848 |
| Lead | 1.273 | -1.460 | 1.273 | -4.705 |
| Nickel | 0.8460 | 2.255 | 0.8460 | 0.0584 |
| Silver | 1.72 | -6.59 | -- | -- |
| Zinc | 0.8473 | 0.884 | 0.8473 | 0.884 |

 The conversion factors (CF) below must be used in the equations above for the hardness-dependent metals in order to convert total recoverable metals criteria to dissolved metals criteria. For metals that are not hardness-dependent (i.e. arsenic, chromium VI, selenium, and silver (chronic)), or are saltwater criteria, the criterion value associated with the metal in Table 30 already reflects a dissolved criterion based on its conversion factor below.

**Conversion Factor (CF) Table for Dissolved Metals**

|  |  |  |
| --- | --- | --- |
| **Chemical** | **Freshwater** | **Saltwater** |
| **Acute** | **Chronic** | **Acute** | **Chronic** |
| Arsenic | 1.000 | 1.000 | 1.000 | 1.000 |
| Cadmium | N/A | 1.101672-[(ln hardness)(0.041838)] | 0.994 | 0.994 |
| Chromium III | 0.316 | 0.860 | -- | -- |
| Chromium VI | 0.982 | 0.962 | 0.993 | 0.993 |
| Copper | N/A | N/A | 0.83 | 0.83 |
| Lead | 1.46203-[(ln hardness)(0.145712)] | 1.46203-[(ln hardness)(0.145712)] | 0.951 | 0.951 |
| Nickel | 0.998 | 0.997 | 0.990 | 0.990 |
| Selenium | 0.996 | 0.922 | 0.998 | 0.998 |
| Silver | 0.85 | 0.85 | 0.85 | -- |
| Zinc | 0.978 | 0.986 | 0.946 | 0.946 |

**Footnote M: Equations for Freshwater Ammonia Calculations**

**Acute Criterion**

The 1-hour average\* concentration of un-ionized ammonia (mg/L NH3) does not exceed more often than once every three years on average, the numerical value given by:

CMCNH3 = 0.52/FT/FPH/2 where:

FT = 10 0.03(20-TCAP); TCAP ≤ T ≤ 30 C

FT = 10 0.03(20-T); 0 ≤ T ≤ TCAP

FPH = 1 8≤ pH ≤ 9

FPH = 1 + 10 7.4-pH 6.5 ≤ pH ≤ 8

 1.25

TCAP = 20 C; Salmonids and other sensitive coldwater species present

TCAP = 25 C; Salmonids and other sensitive coldwater species absent

\* An averaging period of one hour may not be appropriate if excursions of concentrations to greater than 1.5 times the average occur during the hour. In such case, a shorter averaging period may be needed.

**Chronic Criterion**

The 4-day average concentration of un-ionized ammonia (mg/L NH3) does not exceed more often than once every three years on average, the average\* numerical value given by:

CCCNH3 = 0.80/FT/FPH/RATIO

where FT and FPH are as above for acute criterion and:

RATIO = 16 7.7 ≤ pH ≤ 9

RATIO = 24 X (107.7 – pH/1 + 10 7.4-pH) 6.5≤ pH ≤ 7.7

TCAP = 15 C; Salmonids and other sensitive coldwater species present

TCAP = 20 C; Salmonids and other sensitive coldwater species absent

\*Because these formulas are nonlinear in pH and temperature, the criterion should be the average of separate evaluation of the formulas reflective of the fluctuations of flow, pH and temperature within the averaging period. It is not appropriate in general to simply apply the formula to average pH, temperature and flow.