

**PETITION 2019-02 – 04/15/2019 (SELENIUM)**

**PROPOSED PERMANENT REGULATION OF THE  
NEVADA STATE ENVIRONMENTAL COMMISSION**

AUTHORITY: §§1-318, NRS 445A.425 and 445A.520.

A PERMANENT REGULATION relating to water quality; making various changes in provisions that establish standards for water quality; and providing other matters properly relating thereto.

**PETITION 2019-02** Changes to the Nevada Administrative Code revising the Nevada water quality regulations to adopt USEPA's 2016 criterion for selenium for protection of aquatic life in the Water Quality Standards NAC 445A.11704 through NAC 445A.1242

**Proposed Revisions:**

The proposed updates to the NAC are shown below with **deletions in red and strikeout** and *additions in blue*:

**Legislative Counsel Bureau Drafters Note: Instructions for Petition P2019-02**

**Standards for Surface Water Quality**

**Proposed Revisions:**

**NAC 445A.1236** Standards for toxic materials applicable to designated waters. ([NRS 445A.425](#), [445A.520](#))

1. Except for waters which have site-specific standards for toxic materials or as otherwise provided in this section, the standards for toxic materials prescribed in subsection 2 are applicable to the waters specified in [NAC 445A.123](#) to [445A.2234](#), inclusive. The following criteria apply to this section:

(a) If the standards are exceeded at a site and are not economically controllable, the Commission will review and may adjust the standards for the site.

(b) If a standard does not exist for each designated beneficial use, a person who plans to discharge waste must demonstrate that no adverse effect will occur to a designated beneficial use. If the discharge of a substance will lower the quality of the water, a person who plans to discharge waste must meet the requirements of [NRS 445A.565](#).

(c) If a criterion is less than the detection limit of a method that is acceptable to the Division, laboratory results which show that the substance was not detected shall be deemed to show compliance with the standard unless other information indicates that the substance may be present.

2. The standards for toxic materials are:

Chemical	Municipal or Domestic Supply (µg/l)	Aquatic Life <sup>(1,2)</sup> (µg/l)	Irrigation (µg/l)	Watering of Livestock (µg/l)
<b>INORGANIC CHEMICALS<sup>(3)</sup></b>				
Antimony	146 <sup>a</sup>	-	-	-
Arsenic	50 <sup>b</sup>	-	100 <sup>c</sup>	200 <sup>d</sup>
1-hour average	-	340 <sup>e,(4)</sup>	-	-
96-hour average	-	150 <sup>e,(4)</sup>	-	-
Barium	2,000 <sup>b</sup>	-	-	-
Beryllium	0 <sup>a</sup>	-	100 <sup>c</sup>	-
Boron	-	-	750 <sup>a</sup>	5,000 <sup>d</sup>
Cadmium	5 <sup>b</sup>	-	10 <sup>d</sup>	50 <sup>d</sup>
1-hour average	-	$(1.136672 - \{\ln(\text{hardness})(0.041838)\}) * e^{(1.0166\{\ln(\text{hardness})\} - 3.924)}$ e,(4)	-	-
96-hour average	-	$(1.101672 - \{\ln(\text{hardness})(0.041838)\}) * e^{(0.7409\{\ln(\text{hardness})\} - 4.719)}$ e,(4)	-	-
Chromium (total)	100 <sup>b</sup>	-	100 <sup>d</sup>	1,000 <sup>d</sup>
Chromium (VI)	-	-	-	-
1-hour average	-	16 <sup>e,(4)</sup>	-	-
96-hour average	-	11 <sup>e,(4)</sup>	-	-
Chromium (III)	-	-	-	-
1-hour average	-	$(0.316) * e^{(0.8190\{\ln(\text{hardness})\} + 3.7256)}$ e,(4)	-	-
96-hour average	-	$(0.860) * e^{(0.8190\{\ln(\text{hardness})\} + 0.6848)}$ e,(4)	-	-
Copper	-	-	200 <sup>d</sup>	500 <sup>d</sup>
1-hour average	-	$(0.960) * e^{(0.9422\{\ln(\text{hardness})\} - 1.700)}$ e,(4)	-	-
96-hour average	-	$(0.960) * e^{(0.8545\{\ln(\text{hardness})\} - 1.702)}$ e,(4)	-	-
Cyanide	200 <sup>a</sup>	-	-	-
1-hour average	-	22 <sup>e,(5)</sup>	-	-
96-hour average	-	5.2 <sup>e,(5)</sup>	-	-
Fluoride	-	-	1,000 <sup>d</sup>	2,000 <sup>d</sup>
Iron	-	-	5,000 <sup>d</sup>	-
96-hour average	-	1,000 <sup>e</sup>	-	-
Lead	50 <sup>a,b</sup>	-	5,000 <sup>d</sup>	100 <sup>d</sup>
1-hour average	-	$(1.46203 - \{\ln(\text{hardness})(0.145712)\}) * e^{(1.273\{\ln(\text{hardness})\} - 1.460)}$ e,(4)	-	-
96-hour average	-	$(1.46203 - \{\ln(\text{hardness})(0.145712)\}) * e^{(1.273\{\ln(\text{hardness})\} - 4.705)}$ e,(4)	-	-
Manganese	-	-	200 <sup>d</sup>	-
Mercury	2 <sup>b</sup>	-	-	10 <sup>d</sup>
1-hour average	-	1.4 <sup>e,(4)</sup>	-	-
96-hour average	-	0.77 <sup>e,(4)</sup>	-	-
Molybdenum	-	-	-	-
1-hour average	-	6,160 <sup>f</sup>	-	-
96-hour average	-	1,650 <sup>f</sup>	-	-
Nickel	13.4 <sup>a</sup>	-	200 <sup>d</sup>	-
1-hour average	-	$(0.998) * e^{(0.8460\{\ln(\text{hardness})\} + 2.255)}$ e,(4)	-	-
96-hour average	-	$(0.997) * e^{(0.8460\{\ln(\text{hardness})\} + 0.0584)}$ e,(4)	-	-
Selenium <sup>gh</sup>	50 <sup>b</sup>	-	20 <sup>d</sup>	50 <sup>d</sup>
<b>30-day average</b>				
<b>Not &gt;1 exceedance in 3 years</b>				
<del>1-hour average</del>	-	<b>20<sup>a</sup> See NAC 445A.1237</b>	-	-
<del>96-hour average</del>	-	<b>5.0<sup>e</sup> See NAC 445A.1237</b>	-	-
Silver	-	-	-	-
1-hour average	-	$(0.85) * e^{(1.72\{\ln(\text{hardness})\} - 6.59)}$ e,(4)	-	-
Sulfide (undissociated hydrogen sulfide)	-	-	-	-
96-hour average	-	2.0 <sup>e</sup>	-	-
Thallium	13 <sup>a</sup>	-	-	-
Zinc	-	-	2,000 <sup>d</sup>	25,000 <sup>d</sup>
1-hour average	-	$(0.978) * e^{(0.8473\{\ln(\text{hardness})\} + 0.884)}$ e,(4)	-	-
96-hour average	-	$(0.986) * e^{(0.8473\{\ln(\text{hardness})\} + 0.884)}$ e,(4)	-	-
<b>ORGANIC CHEMICALS</b>				
Acrolein	320 <sup>a</sup>	-	-	-

Chemical	Municipal or Domestic Supply (µg/l)	Aquatic Life <sup>(1,2)</sup> (µg/l)	Irrigation (µg/l)	Watering of Livestock (µg/l)
1-hour average	-	3 <sup>e</sup>	-	-
96-hour average	-	3 <sup>e</sup>	-	-
Aldrin	0 <sup>a</sup>	-	-	-
1-hour average	-	3.0 <sup>e</sup>	-	-
alpha-Endosulfan	-	-	-	-
1-hour average	-	0.22 <sup>e</sup>	-	-
96-hour average	-	0.056 <sup>e</sup>	-	-
beta-Endosulfan	-	-	-	-
1-hour average	-	0.22 <sup>e</sup>	-	-
96-hour average	-	0.056 <sup>e</sup>	-	-
Benzene	5 <sup>b</sup>	-	-	-
Bis (2-chloroisopropyl) ether	34.7 <sup>a</sup>	-	-	-
Chlordane	0 <sup>a</sup>	-	-	-
1-hour average	-	2.4 <sup>e</sup>	-	-
96-hour average	-	0.0043 <sup>e</sup>	-	-
Chloroethylene (vinyl chloride)	2 <sup>b</sup>	-	-	-
Chlorpyrifos	-	-	-	-
1-hour average	-	0.083 <sup>e</sup>	-	-
96-hour average	-	0.041 <sup>e</sup>	-	-
2,4-D	100 <sup>a,b</sup>	-	-	-
DDT & metabolites	0 <sup>a</sup>	-	-	-
4,4'-DDT	-	-	-	-
1-hour average	-	1.1 <sup>e,(6)</sup>	-	-
96-hour average	-	0.001 <sup>e,(6)</sup>	-	-
Demeton	-	-	-	-
96-hour average	-	0.1 <sup>e</sup>	-	-
Diazinon	-	-	-	-
1-hour average	-	0.17 <sup>e</sup>	-	-
96-hour average	-	0.17 <sup>e</sup>	-	-
Dibutyl phthalate	34,000 <sup>a</sup>	-	-	-
m-dichlorobenzene	400 <sup>a</sup>	-	-	-
o-dichlorobenzene	400 <sup>a</sup>	-	-	-
p-dichlorobenzene	75 <sup>b</sup>	-	-	-
1,2-dichloroethane	5 <sup>b</sup>	-	-	-
1,1-dichloroethylene	7 <sup>b</sup>	-	-	-
2,4-dichlorophenol	3,090 <sup>a</sup>	-	-	-
Dichloropropenes	87 <sup>a</sup>	-	-	-
Dieldrin	0 <sup>a</sup>	-	-	-
1-hour average	-	0.24 <sup>e</sup>	-	-
96-hour average	-	0.056 <sup>e</sup>	-	-
Di-2-ethylhexyl phthalate	15,000 <sup>a</sup>	-	-	-
Diethyl phthalate	350,000 <sup>a</sup>	-	-	-
Dimethyl phthalate	313,000 <sup>a</sup>	-	-	-
4,6-dinitro-2-methylphenol	13.4 <sup>a</sup>	-	-	-
Dinitrophenols	70 <sup>a</sup>	-	-	-
Endosulfan	75 <sup>a</sup>	-	-	-
Endrin	0.2 <sup>b</sup>	-	-	-
1-hour average	-	0.086 <sup>e</sup>	-	-
96-hour average	-	0.036 <sup>e</sup>	-	-
Ethylbenzene	1,400 <sup>a</sup>	-	-	-
Fluoranthene (polynuclear aromatic hydrocarbon)	42 <sup>a</sup>	-	-	-
Guthion	-	-	-	-
96-hour average	-	0.01 <sup>e</sup>	-	-
Heptachlor	-	-	-	-
1-hour average	-	0.52 <sup>e</sup>	-	-
96-hour average	-	0.0038 <sup>e</sup>	-	-
Heptachlor Epoxide	-	-	-	-
1-hour average	-	0.52 <sup>e</sup>	-	-
96-hour average	-	0.0038 <sup>e</sup>	-	-
Hexachlorocyclopentadiene	206 <sup>a</sup>	-	-	-

Chemical	Municipal or Domestic Supply (µg/l)	Aquatic Life <sup>(1,2)</sup> (µg/l)	Irrigation (µg/l)	Watering of Livestock (µg/l)
Isophorone	5,200 <sup>a</sup>	-	-	-
Lindane	4 <sup>b</sup>	-	-	-
1-hour average	-	0.95 <sup>e</sup>	-	-
Malathion	-	-	-	-
96-hour average	-	0.1 <sup>e</sup>	-	-
Methoxychlor	100 <sup>a,b</sup>	-	-	-
96-hour average	-	0.03 <sup>e</sup>	-	-
Mirex	0 <sup>a</sup>	-	-	-
96-hour average	-	0.001 <sup>e</sup>	-	-
Monochlorobenzene	488 <sup>a</sup>	-	-	-
Nitrobenzene	19,800 <sup>a</sup>	-	-	-
Nonylphenol	-	-	-	-
1-hour average	-	28 <sup>e</sup>	-	-
96-hour average	-	6.6 <sup>e</sup>	-	-
Parathion	-	-	-	-
1-hour average	-	0.065 <sup>a</sup>	-	-
96-hour average	-	0.013 <sup>a</sup>	-	-
Pentachlorophenol	1,010 <sup>a</sup>	-	-	-
1-hour average	-	$e^{1.005(\text{pH}) - 4.869e}$	-	-
96-hour average	-	$e^{1.005(\text{pH}) - 5.134e}$	-	-
Phenol	3,500 <sup>a</sup>	-	-	-
Polychlorinated biphenyls (PCBs)	0 <sup>a</sup>	-	-	-
96-hour average	-	0.014 <sup>e</sup>	-	-
Silvex (2,4,5-TP)	10 <sup>a,b</sup>	-	-	-
Tetrachloromethane (carbon tetrachloride)	5 <sup>b</sup>	-	-	-
Toluene	14,300 <sup>a</sup>	-	-	-
Toxaphene	5 <sup>b</sup>	-	-	-
1-hour average	-	0.73 <sup>a</sup>	-	-
96-hour average	-	0.0002 <sup>a</sup>	-	-
Tributyltin (TBT)	-	-	-	-
1-hour average	-	0.46 <sup>e</sup>	-	-
96-hour average	-	0.072 <sup>e</sup>	-	-
1,1,1-trichloroethane (TCA)	200 <sup>b</sup>	-	-	-
Trichloroethylene (TCE)	5 <sup>b</sup>	-	-	-
Trihalomethanes (total) <sup>(7)</sup>	100 <sup>b</sup>	-	-	-

Footnotes:

- (1) One-hour average and 96-hour average concentration limits may be exceeded only once every 3 years. See reference a.
- (2) Aquatic life standards apply to surface waters only; "hardness" is expressed as mg/L CaCO<sub>3</sub>; and "e" refers to the base of the natural logarithm whose value is 2.718.
- (3) The standards for metals are expressed as total recoverable, unless otherwise noted.
- (4) This standard applies to the dissolved fraction.
- (5) This standard is expressed as free cyanide.
- (6) This standard applies to DDT and its metabolites (i.e., the total concentration of DDT and its metabolites should not exceed this value).
- (7) The standard for trihalomethanes (TTHMs) is the sum of the concentration of bromodichloromethane, dibromochloromethane, tribromomethane (bromoform) and trichloromethane (chloroform). See reference b.

References:

- a. U.S. Environmental Protection Agency, Pub. No. EPA 440/5-86-001, Quality Criteria for Water (Gold Book) (1986).
- b. Federal Maximum Contaminant Level (MCL), 40 C.F.R. §§ 141.11, 141.61 and 141.62 (1992).
- c. U.S. Environmental Protection Agency, Pub. No. EPA 440/9-76-023, Quality Criteria for Water (Red Book) (1976).
- d. National Academy of Sciences, Water Quality Criteria (Blue Book) (1972).
- e. Not used to avoid confusion with "e" as a natural logarithm.
- f. U.S. Environmental Protection Agency, National Recommended Water Quality Criteria, May 2009.

g. Nevada Division of Environmental Protection, Aquatic Life Water Quality Criteria for Molybdenum, Tetra Tech, Inc., (June 2008).

h. U.S. Environmental Protection Agency, *Aquatic Life Ambient Water Quality Criterion for Selenium – Freshwater*, June 2016a.

(Added to NAC by Environmental Comm’n, eff. 9-13-85; A 9-25-90; 7-5-94; 11-29-95; R158-06, 9-18-2006; R160-06, 8-26-2008; R186-08, 12-17-2008; R129-12, 12-20-2012) — (Substituted in revision for NAC 445A.144)

**NAC 445A.1237 Water Quality Criterion for Selenium (Aquatic-Life Beneficial Use).** There are multiple components to the new water quality criterion (WQC) for selenium, with numeric criterion values for concentrations of selenium in three types of fish tissue (egg-ovary, whole body, and muscle) and two criterion values for chronic exposures in two types of waterbodies (lotic, which includes all flowing waters, and lentic, which includes lakes and reservoirs). The selenium criterion also includes a formula for calculating numeric values for intermittent exposures to higher concentrations of selenium in the water column, for lotic and lentic waterbodies. All numeric values for Nevada were derived for “non-sturgeon waters” because there are no sturgeon or related species in Nevada.

1. The criterion values for fish tissue are instantaneous values that are not to be exceeded. Each criterion value depends on the type of tissue sample analyzed, as follows:

- (a) Egg or ovary fish tissue is 19.0 milligrams per kilogram, dry weight
- (b) Muscle (skinless, boneless fillet) fish tissue is 13.1 milligrams per kilogram, dry weight
- (c) Whole-body fish tissue is 9.5 milligrams per kilogram, dry weight.

Guidance for sampling of fish tissue is provided in USEPA 2016a and 2016b. In general, a composite sample of five fish or individual samples of five fish are recommended. See implementation guidance (USEPA 2016b) for specific details on sampling for fish tissue.

2. The chronic criterion values for the concentration of dissolved selenium in the water column are values not to be exceeded more than once every three years, on average. These values are specific to waterbody type, as follows:

- (a) The 30-day average for lotic (i.e., flowing) waters is 3.9 micrograms per liter
- (b) The 30-day average for lentic (i.e., still) waters is 1.9 micrograms per liter

3. The criterion value for intermittent exposure is a calculated value, which is not to be exceeded more than once every three years, on average. The formula is as follows:

$$WQC_{int} = (WQC_{30\text{-day}} - C_{bkgd}(1 - f_{int}))/f_{int}$$

Where: the  $WQC_{30\text{-day}}$  is 1.9 micrograms per liter for lentic waters and 3.9 micrograms per liter for lotic waters

4. Site-specific criterion values for selenium in fish tissue and the water column may also be derived, based on data collected following submittal and approval of a sampling and analysis plan for the collection and analysis of fish tissue. See implementation guidance (USEPA 2016b) for specific details on sampling, analysis and derivation of site-specific values.

USEPA (2016a). *Aquatic Life Ambient Water Quality Criterion for Selenium – Freshwater*. EPA 822-R-16-006. June.

USEPA (2016b). *Draft Technical Support for Fish Tissue Monitoring for Implementation of EPA’s 2016 Selenium Criterion*. EPA 820-F-16-007. September.

TYPE OF STANDARD/CRITERION	2019 Proposed for Nevada, Statewide	UNITS
<b>FISH TISSUE (FRESHWATER)</b>		
Fish egg/ovary tissue	<b>19.0</b>	mg/kg
Fish whole body	<b>9.5</b>	mg/kg
Fish muscle (skinless, boneless fillet)	<b>13.1</b>	mg/kg
<b>WATER COLUMN</b>		

30-day average, lentic systems	<b>1.9</b>	µg/L
30-day average, lotic systems	<b>3.9</b>	µg/L
Intermittent (>1 every 3 yrs), lentic	$(1.9 - C_{\text{bkgd}}(1 - f_{\text{int}}))/f_{\text{int}}$	µg/L
Intermittent (>1 every 3 yrs), lotic	$(3.9 - C_{\text{bkgd}}(1 - f_{\text{int}}))/f_{\text{int}}$	µg/L

µg/L = micrograms per liter  
mg/kg = milligrams per kilogram

The following equation is used for calculating the "average background" for a 30-day period (see Equation 20, EPA 2016):

$$C_{30\text{-day}} = C_{\text{int}} * f_{\text{int}} + C_{\text{bkgd}}(1 - f_{\text{int}})$$

$C_{\text{int}}$  = the intermittent spike concentration, in µg/L

$f_{\text{int}}$  = the fraction of any 30-day period during which there are elevated concentrations of selenium

$C_{\text{bkgd}}$  = the average daily ambient (background) concentration, integrated over 30 days

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