



## **Fact Sheet: Proposed Revisions to Ambient Water Quality Criterion for Selenium**

### **Proposed Petition 2019-02: Updated Criterion for Selenium**

The Clean Water Act requires the U.S. Environmental Protection Agency (EPA) to periodically update all ambient water quality criteria, including numeric criteria for toxic materials such as selenium. In 2016, EPA released an updated ambient water quality criterion for selenium to protect aquatic life, based on selenium bioaccumulation via dietary uptake. EPA (2016) describes a four-part criterion, with values for selenium in fish tissue and selenium dissolved in the water column.

The updated values for selenium represent the concentrations of selenium that should not be exceeded in a waterbody, and are based on the results of toxicity testing on aquatic organisms. Selenium toxicity is primarily manifested as reproductive impairment due to maternal transfer, resulting in embryotoxicity and teratogenicity in egg-laying vertebrates. The new values provided in the 2016 criterion will better protect aquatic life by accounting for bioaccumulation of selenium through the food chain.

Nevada's current aquatic-life criteria for selenium are based on EPA's 1987 selenium criteria for aquatic life, so the Nevada Division of Environmental Protection (NDEP) is proposing to adopt EPA's 2016 criterion, with modification. NDEP recalculated the criterion values to reflect the absence of sturgeon in Nevada by applying EPA's recalculation procedure (EPA 2013) to the data presented in the 2016 criterion document. This allowed NDEP to develop statewide selenium criterion values for "sturgeon-free waters." By removing the toxicity test data for sturgeon and recalculating the values, NDEP generated statewide criterion values for selenium that are higher than EPA's national recommended values for selenium in fish tissue and water (EPA 2016).

### **What is the Process for Adopting Water Quality Standards in Nevada?**

- EPA publishes final criteria for a parameter
- BWQP provides public workshops to obtain public input on the proposed petition and draft regulation
- NDEP's Bureau of Water Quality Planning (BWQP) prepares a petition with new or revised criteria and submits it to the Legislative Council Bureau (LCB) for review
- State Environmental Commission (SEC) reviews and approves the draft regulation
- EPA reviews the draft regulation (used in implementing the Clean Water Act), if approved
- Draft goes to the LCB to become final and is codified into the Nevada Administrative Code (NAC)

### **Water Quality Standards Consist of Three Components:**

1. Designated **beneficial uses** for each waterbody
2. **Criteria** to protect beneficial uses
3. **Antidegradation provision** - Requirements to maintain higher quality (RMHQs) are used in Nevada

### **Nevada's Water Quality Standards are Provided in NAC 445A.11704 - 445A.2234**

Nevada's water quality standards define the water quality goals for a waterbody by designating beneficial uses of the water and setting criteria necessary to protect those beneficial uses. Beneficial uses include, but are not limited to: propagation of aquatic life, irrigation, recreation, watering of livestock and drinking water supply. Water quality criteria for selenium represent concentrations that may not be exceeded, in order to protect aquatic life from the toxic effects of selenium under acute and chronic exposures. Current standards for selenium are found in NAC 445A.1236.

## Summary

The NDEP is proposing to amend NAC 445A.11704 – 445A.2234, Standards for Water Quality, to align with the most-current recommendations of EPA to protect aquatic life from exposure to selenium. However, NDEP has modified the criterion values to better reflect conditions in Nevada, by applying EPA’s “Recalculation Procedure” to the toxicity test data. The 2016 criterion for selenium also allows for development of site-specific standards for resident species that may have adapted to higher concentrations of selenium in the food web or may have different rates of bioaccumulation than those used by EPA to derive the national recommended criterion values.

Some areas, especially in the western U.S., have high concentrations of selenium that are naturally occurring in the soil. However, human actions may have mobilized the naturally occurring selenium, which may then adversely affect aquatic life in streams and lakes that receive urban or agricultural runoff. Aquatic life may have adapted to these higher concentrations of selenium; therefore, site-specific criterion values for selenium may be developed when the data are collected using an approved sampling and analysis plan and EPA procedures.

Nevada’s current standards, EPA’s 2016 criterion values and Nevada’s proposed updated standards to protect aquatic life are shown below. The updated standards are proposed to be included as NAC 445A.1237, which describes statewide standards for selenium based on a recalculation for “sturgeon-free waters.” The values for water are for dissolved selenium. In all cases, data for egg-ovary tissue supersede all other categories of data; that is, if concentrations in tissue do not exceed the criterion value, then selenium levels at the site are acceptable, regardless of the concentrations in the water column. The supremacy of tissue data can be summarized as **Egg-Ovary > Muscle > Whole Body > Water Column** data.

Selenium Criterion	Chronic Exposures					Short-term
	Fish Tissue (mg/kg dw)			Water Column (µg/L)		Water Column (µg/L)
	Egg-Ovary	Muscle	Whole Body	Water (Lakes)	Water (Streams)	Water
Nevada (current)	na	na	na	5	5	20 (acute exposure)
EPA, 2016	15.1	11.3	8.5	1.5	3.1	Intermittent Exposure Equation
Nevada (proposed) “sturgeon-free” waters	<b>19.0</b>	<b>13.1</b>	<b>9.5</b>	<b>1.9</b>	<b>3.9</b>	<b>Intermittent Exposure Equation</b>

mg/kg dw = milligrams per kilogram dry weight, µg/L = micrograms per liter. See EPA 2016 for Intermittent Exposure Equation.

## References

- EPA 1987. Ambient Water Quality Criteria for Selenium – 1987. September. EPA-440/5-87-008  
 EPA 2013. Revised Deletion Process for the Site-Specific Recalculation Procedure for Aquatic Life Criteria. EPA-823-R-13-001. April.  
 EPA 2016. Aquatic Life Ambient Water Quality Criterion for Selenium – Freshwater 2016. EPA 822-R-16-006. June.

Additional information is available at <https://www.epa.gov/wqc/aquatic-life-criterion-selenium-documents>

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