



ENVIRONMENTAL PROTECTION AGENCY

[EPA-HQ-OW-2004-0019; FRL 9949-02-OW]

Recommended Aquatic Life Ambient Water Quality Criterion for Selenium in Freshwater

AGENCY: Environmental Protection Agency (EPA).

ACTION: Notice of availability.

SUMMARY: The Environmental Protection Agency (EPA) is announcing the release of a final updated Clean Water Act (CWA) section 304(a) recommended national chronic aquatic life criterion for the pollutant selenium in fresh water. The final criterion supersedes EPA's 1999 CWA section 304(a) recommended national acute and chronic aquatic life criteria for selenium. The 2016 recommended criterion reflects the latest scientific information, which indicates that selenium toxicity to aquatic life is primarily based on organisms consuming selenium-contaminated food rather than direct exposure to selenium dissolved in water. Draft versions of the criterion underwent public review in 2014 and 2015 and external peer review in 2015. EPA considered all public comments and peer reviewer comments in the development of the 2016 final selenium criterion document. EPA's water quality criterion for selenium provides recommendations to states and tribes authorized to establish water quality standards under the CWA.

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SUPPLEMENTARY INFORMATION:

I. General Information

A. How Can I Get Copies of This Document and Other Related Information?

1. *Docket.* EPA has established a docket for this action under Docket ID No. EPA-HQ-OW-2004-0019. Publicly available docket materials are available either electronically through <http://www.regulations.gov> or in hard copy at the Water Docket in the EPA Docket Center, (EPA/DC) EPA West, Room 3334, 1301 Constitution Ave., NW, Washington, DC. The EPA Docket Center Public Reading Room is open from 8:30 a.m. to 4:30 p.m., Monday through Friday, excluding legal holidays. The telephone number for the Public Reading Room is (202) 566-1744, and the telephone number for the Water Docket is (202) 566-2426.

2. *Electronic Access.* You may access this **Federal Register** document electronically from the Government Printing Office under the “**Federal Register**” listings FDSys (<http://www.gpo.gov/fdsys/browse/collection.action?collectionCode=FR>).

II. What Are EPA’s Recommended Water Quality Criteria?

EPA’s recommended water quality criteria are scientifically derived numeric values that protect aquatic life or human health from the deleterious effects of pollutants in ambient water. Section 304(a)(1) of the CWA directs EPA to develop and publish and, from time to time, revise criteria for protection of aquatic life and human health that accurately reflect the latest scientific knowledge. Water quality criteria developed under section 304(a) are based on data and the latest scientific knowledge on the relationship between pollutant concentrations and environmental and human health effects. Section 304(a) criteria do not reflect consideration of economic impacts or the technological feasibility of meeting pollutant concentrations in ambient water.

EPA’s section 304(a) recommended criteria provide technical information to states and

authorized tribes in adopting water quality standards (WQS) that ultimately provide a basis for assessing water body health and controlling discharges or releases of pollutants. Under the CWA and its implementing regulations, states and authorized tribes are to adopt water quality criteria to protect designated uses (e.g., public water supply, aquatic life, recreational use, or industrial use). EPA's recommended water quality criteria do not substitute for the CWA or regulations, nor are they regulations themselves. EPA's recommended criteria do not impose legally binding requirements. States and authorized tribes have the discretion to adopt, where appropriate, other scientifically defensible water quality criteria that differ from these recommendations.

III. What is Selenium and Why is EPA Concerned About It?

Selenium is a naturally occurring element that can be released into water resources by natural sources via weathering and by anthropogenic sources, such as surface mining, coal-fired power plants, and irrigated agriculture. Selenium is nutritionally essential for animals in small amounts, but toxic at higher concentrations. Selenium bioaccumulates in the aquatic food chain, and toxicity in fish occurs primarily through maternal transfer to the eggs. Chronic maternal exposure in fish and aquatic invertebrates can cause reproductive impairments (e.g., larval deformity or mortality); other aquatic effects include impacts on juvenile growth and mortality.

IV. Information on the Aquatic Life Ambient Water Quality Criterion

EPA has updated the aquatic life criterion document for selenium based on the latest scientific knowledge and current EPA policies and methods, including EPA's *Guidelines for Deriving Numerical National Water Quality Criteria for the Protection of Aquatic Organisms and Their Uses* (1985) (EPA/R-85-100) and *Guidelines for Ecological Risk Assessment* (1998) (EPA/630/R-95/002F). Toxicity data and other information on the effects of selenium were subjected to both internal and external peer review. In 2004, EPA published the first draft of the

updated recommended selenium criterion using fish-tissue concentrations. In 2009, EPA helped organize an international expert workshop on selenium and initiated collaboration with the U.S. Geological Survey to develop a selenium bioaccumulation model. EPA then revised the 2004 draft criterion to include fish tissue and water column concentrations. In 2014, EPA released the draft recommended criterion for public comment and external peer review. EPA revised the draft recommended criterion accordingly and in 2015 released the draft for a second round of public comment. EPA has considered all public comments and peer reviewer comments in the development of the 2016 final selenium criterion document.

The 2016 selenium criterion document recommends that states and authorized tribes adopt a multi-media criterion into their water quality standards. The criterion has four elements, and EPA recommends that states include all four elements in their standards. Because adverse reproductive effects are most closely linked to selenium concentrations in fish tissue, the 2016 chronic criterion is based primarily on concentrations in fish egg-ovary tissues and is translated into whole body, muscle, and water column concentrations for lakes/reservoirs and rivers/streams to create the four elements of the chronic criterion (two fish tissue and two water column). EPA recommends that when implementing the criterion, the fish tissue elements take precedence over the water column elements, except in certain circumstances. For example, water column values are the applicable criterion element in the absence of fish tissue measurements, such as waters where fish have been extirpated or where physical habitat and/or flow regime cannot sustain fish populations, or in waters with new discharges of selenium where steady state has not been achieved between water and fish tissue at the site. The previous 1999 acute and chronic recommended criteria were water column concentrations only. The table below compares the 2016 criterion with the 1999 criteria.

Comparison of Final 2016 Selenium Criterion to 1999 Criteria.

Criterion Version	Chronic					Short-term
	Egg-Ovary ¹ [mg/kg dw]	Whole Body ¹ [mg/kg dw]	Muscle ¹ [mg/kg dw]	Water ¹ Lentic [µg/L]	Water ¹ Lotic [µg/L]	Water [µg/L]
2016 Final Update	15.1	8.5	11.3	1.5 (30 d)	3.1 (30 d)	Intermittent exposure equation
1999 Selenium Criteria	N/A	N/A	N/A	5 (4 d)	5 (4 d)	Acute Equation based on water column concentration

¹ A note on hierarchy of table: when fish egg/ovary concentrations are measured, the values supersede any whole-body, muscle, or water column elements except in certain situations. Whole body or muscle measurements supersede any water column element when both fish tissue and water concentrations are measured, except in certain situations (see examples in text above). Water column values are derived from fish tissue concentrations.

The criterion document does not include an acute criterion (based on water-only exposure) because selenium is bioaccumulative and toxicity primarily occurs through dietary exposure. EPA derived an intermittent exposure criterion element from the 30-day average water column criterion element for situations where elevated inputs of selenium could result in bioaccumulation in the ecosystem and potential chronic effects in fish (e.g., new discharges).

V. What is the Relationship between the Water Quality Criterion and Your State or Tribal Water Quality Standards?

As part of the WQS triennial review process defined in section 303(c)(1) of the CWA, the states and authorized tribes are responsible for maintaining and revising WQS. Standards consist of designated uses, water quality criteria to protect those uses, a policy for antidegradation, and may include general policies for application and implementation. Section 303(c)(1) requires states and authorized tribes to review and modify, if appropriate, their WQS at least once every three years.

States and authorized tribes must adopt water quality criteria that protect designated uses. Consistent with EPA’s regulations at 40 CFR 131.11(a), protective criteria must be based on a

sound scientific rationale and contain sufficient parameters or constituents to protect the designated uses. Criteria may be expressed in either narrative or numeric form. States and authorized tribes have four options when adopting water quality criteria for which EPA has published section 304(a) criteria. They may:

- (1) Establish numerical values based on recommended section 304(a) criteria;
- (2) Adopt section 304(a) criteria modified to reflect site-specific conditions;
- (3) Adopt criteria derived using other scientifically defensible methods; or
- (4) Establish narrative criteria where numeric criteria cannot be established or to supplement numerical criteria (40 CFR 131.11(b)).

EPA's regulation at 40 CFR 131.20(a) provides that if a state does not adopt new or revised criteria parameters for which EPA has published new or updated recommendations, then the state shall provide an explanation when it submits the results of its triennial review to the Regional Administrator consistent with CWA section 303(c)(1). The updated section 304(a) selenium criteria supersede EPA's previous 304(a) recommended criteria for selenium. Consistent with 40 CFR 131.21, new or revised water quality criteria adopted into law or regulation by states and authorized tribes on or after May 30, 2000 are applicable water quality standards for CWA purposes only after EPA approval.

VI. Additional Information:

EPA is developing a set of technical support documents to assist states. These materials will include fish tissue monitoring guidance as well as FAQs and fact sheets addressing flexibilities for states and authorized tribes in implementing the criteria, assessing and listing water body impairments, and wastewater permitting.

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