

# Frequently Asked Questions: Implementing EPA's 2016 Selenium Criterion in Clean Water Act Sections 303(d) and 305(b) Assessment, Listing, and Total Maximum Daily Load Programs

Draft

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## Draft

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## List of Acronyms

<b>µg/L</b>	micrograms per liter
<b>CFR</b>	Code of Federal Regulations
<b>CWA</b>	Clean Water Act
<b>EPA</b>	Environmental Protection Agency
<b>FAQ</b>	Frequently asked question
<b>mg/kg</b>	milligrams per kilogram
<b>NPDES</b>	National Pollutant Discharge Elimination System
<b>TMDL</b>	Total Maximum Daily Load
<b>USEPA</b>	United States Environmental Protection Agency
<b>WQBEL</b>	Water Quality-Based Effluent Limit
<b>WQC</b>	Water Quality Criterion
<b>WQS</b>	Water Quality Standard

## Definitions

### **Bioaccumulation**

The uptake and retention of a chemical by an aquatic organism from all surrounding media (e.g., water, food, sediment).<sup>1</sup>

### **Dissolved total selenium**

All species of selenium that are dissolved into the water column and that would be measured in a water sample after it has been passed through a 0.45 µm membrane filter.<sup>2</sup>

### **Performance-based approach**

A water quality criterion that is a transparent process, such as a criterion derivation methodology, rather than a specific outcome, such as a concentration of a pollutant. This process or methodology is sufficiently detailed and has suitable safeguards that ensure predictable, repeatable outcomes. Once approved by EPA, this approval would also serve for CWA purposes as the approval of each outcome generated from following that process or method.<sup>3</sup>

### **Steady-state**

An organism is in steady-state when the rates of chemical uptake and depuration are equal and tissue concentrations remain constant over time.<sup>4</sup> For the purposes of the national CWA section 304(a) recommended selenium criterion, steady-state refers to conditions where sufficient time has passed after the introduction of a new or increased discharge of selenium into a water body so that fish tissue concentrations of selenium are no longer increasing.<sup>5</sup>

### **Water quality criterion element**

A magnitude, frequency, and duration for a particular media type. The water quality criterion elements for selenium are related through a hierarchy, with fish tissue criterion elements having primacy over water column criterion elements, and the egg-ovary criterion element having primacy over all other criterion elements.

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<sup>1</sup> USEPA. 2003. *Methodology for Deriving Ambient Water Quality Criteria for the Protection of Human Health (2000) Volume 2: Development of National Bioaccumulation Factors*. EPA-882-R-03-030. U.S. Environmental Protection Agency, Office of Water, Washington, DC. pp. 1-4.

<sup>2</sup> Protho, M.G. USEPA. 1993. Memorandum: Office of Water Policy and Technical Guidance on Interpretation and Implementation of Aquatic Life Metals Criteria. Office of Water, Washington DC.  
<https://www.epa.gov/sites/production/files/2019-03/documents/metals-criteria-interpret-aqlife-memo.pdf>

<sup>3</sup> EPA Review and Approval of State and Tribal Water Quality Standards 65 Fed. Reg. 24641 (Apr. 27, 2000)

<sup>4</sup> USEPA. 2003. *Methodology for Deriving Ambient Water Quality Criteria for the Protection of Human Health (2000) Volume 2: Development of National Bioaccumulation Factors*. EPA-882-R-03-030. U.S. Environmental Protection Agency, Office of Water, Washington, DC. pp. 1-4.  
<https://nepis.epa.gov/Exe/ZyPDF.cgi/P1005EZQ.PDF?Dockkey=P1005EZQ.PDF>

<sup>5</sup> USEPA. 2021. *2021 Revision to: Aquatic Life Ambient Water Quality Criterion for Selenium—Freshwater 2016*. EPA 822-R-21-006. U.S. Environmental Protection Agency, Office of Water, Washington, DC.  
<https://www.epa.gov/system/files/documents/2021-08/selenium-freshwater2016-2021-revision.pdf>

## Introduction

### ***EPA's National CWA section 304(a) Recommended Chronic Aquatic Life Selenium Criterion in Freshwater***

In 2016, the United States Environmental Protection Agency (EPA) updated its national Clean Water Act (CWA) section 304(a) recommended chronic aquatic life criterion for selenium in freshwater systems to reflect the latest scientific information. This information indicates that toxicity to aquatic life is driven by dietary exposures and that the reproductive life-stages of egg-laying vertebrates are the most sensitive to the toxic effects of selenium. The criterion has four criterion elements: (1) a fish egg-ovary criterion element; (2) a fish whole-body and/or muscle criterion element; (3) a water column criterion element (one value for lentic and one value for lotic aquatic systems); and (4) a water column intermittent criterion element (to account for potential chronic effects from short-term exposures to high concentrations in lentic and lotic aquatic systems) (see Table 1). Under EPA's 2016 CWA section 304(a) recommended selenium criterion the fish tissue criterion elements have primacy over water column elements, except where there are no fish, where fish tissue data do not meet state or tribal quality assurance procedures, or for water bodies with new discharges where selenium concentrations in fish tissue might not have stabilized. EPA also recommends that the egg-ovary tissue criterion element has primacy over whole-body and muscle tissue criterion elements.

Toxicity data indicate that the selenium concentration in fish eggs and ovaries is the most robust and consistent measurement endpoint directly tied to adverse reproductive effects in aquatic organisms. Toxicity to developing embryos and larvae is directly linked to egg selenium concentration.<sup>6</sup> EPA derived the whole-body, muscle tissue, and water column elements from the egg-ovary element so that states and authorized tribes could more readily implement water quality criteria (WQC) based on EPA's national CWA section 304(a) recommended selenium criterion. The assessment of the available data on chronic selenium exposure for fish, invertebrates, and amphibians indicates that a criterion element derived from fish is expected to be protective of the aquatic community, since other taxa appear to be less sensitive to selenium than fish. EPA did not develop an acute criterion for selenium when it updated the chronic criterion because although selenium may cause acute toxicity at high concentrations, the most deleterious effects on aquatic organisms are due to selenium's bioaccumulative properties. The chronic effects of bioaccumulated selenium occur at lower concentrations than acute effects.

In the case of bioaccumulative compounds like selenium, acute toxicity studies do not address risks that result from chronic exposure to chemicals via the diet (through the food web pathway). Such studies also do not account for the accumulation kinetics of many bioaccumulative compounds, such as selenium, and may underestimate effects from long-term accumulation in some types of aquatic systems. As described in EPA's *2021 Revision to: Aquatic Life Ambient Water Quality Criterion for Selenium–Freshwater 2016* (hereafter referred to as *Aquatic Life*

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<sup>6</sup> USEPA (U.S. Environmental Protection Agency). 2021. *2021 Revision to: Aquatic Life Ambient Water Quality Criterion for Selenium–Freshwater 2016*. EPA 822-R-21-006. U.S. Environmental Protection Agency, Office of Water, Washington, DC. <https://www.epa.gov/system/files/documents/2021-08/selenium-freshwater2016-2021-revision.pdf>

*Ambient Water Quality Criterion for Selenium–Freshwater 2016*), EPA also included an intermittent exposure criterion element to provide protection from the most significant effects of selenium toxicity, reproductive toxicity, by protecting against selenium bioaccumulation in the aquatic ecosystem resulting from short-term, high concentration exposure events.<sup>7</sup> EPA recommends, as stated in the *Aquatic Life Ambient Water Quality Criterion for Selenium–Freshwater 2016*, that states and authorized tribes<sup>8</sup> adopt into their water quality standards (WQS) a selenium criterion that includes all four criterion elements.<sup>9</sup> For more information see EPA’s *Aquatic Life Ambient Water Quality Criterion for Selenium–Freshwater 2016*, which can be found at <https://www.epa.gov/system/files/documents/2021-08/selenium-freshwater2016-2021-revision.pdf>

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<sup>7</sup> Ibid.

<sup>8</sup> Throughout this document and in the [CWA](#), the term “states” means the fifty states, the District of Columbia, the Commonwealth of Puerto Rico, the United States Virgin Islands, Guam, American Samoa, and the Commonwealth of the Northern Mariana Islands. The term “authorized tribe” means those federally recognized Indian tribes with authority to administer a CWA WQS program.

<sup>9</sup> USEPA.2021. *2021 Revision to: Aquatic Life Ambient Water Quality Criterion for Selenium–Freshwater 2016*. EPA 822-R-21-006. U.S. Environmental Protection Agency, Office of Water, Washington, DC. <https://www.epa.gov/system/files/documents/2021-08/selenium-freshwater2016-2021-revision.pdf>



**Table 1. Summary of the Recommended Freshwater Selenium Ambient Chronic Water Quality Criterion for Protection of Aquatic Life.**

Media Type	Fish Tissue <sup>1</sup>		Water Column <sup>4</sup>	
Criterion Element	Egg-ovary <sup>2</sup>	Fish Whole-body or Muscle <sup>3</sup>	Monthly Average Exposure	Intermittent Exposure <sup>5</sup>
Magnitude	15.1 mg/kg dry weight	8.5 mg/kg dry weight whole-body or 11.3 mg/kg dry weight muscle (skinless, boneless fillet)	1.5 µg/L in lentic aquatic systems  3.1 µg/L in lotic aquatic systems	$WQC_{int} = \frac{WQC_{30-day} - C_{bkgrnd}(1 - f_{int})}{f_{int}}$
Duration	Instantaneous measurement <sup>6</sup>	Instantaneous measurement <sup>6</sup>	30 days	Number of days/month with an elevated concentration
Frequency	Not to be exceeded	Not to be exceeded	Not more than once in three years on average	Not more than once in three years on average

1. Fish tissue elements are expressed as steady-state.
2. Egg/ovary supersedes any whole-body, muscle, or water column element when fish egg-ovary concentrations are measured, except as noted in footnote 4 below.
3. Fish whole-body or muscle tissue supersedes water column element when both fish tissue and water concentrations are measured, except as noted in footnote 4 below.
4. Water column values are based on dissolved total selenium in water and are derived from fish tissue values via bioaccumulation modeling. When selenium inputs are increasing, water column values are the applicable criterion element in the absence of steady-state condition fish tissue data.
5. Where  $WQC_{30-day}$  is the water column monthly element for either lentic or lotic waters;  $C_{bkgrnd}$  is the average background selenium concentration; and  $f_{int}$  is the fraction of any 30-day period during which elevated selenium concentrations occur, with  $f_{int}$  assigned a value  $\geq 0.033$  (corresponding to 1 day).
6. Fish tissue data provide instantaneous point measurements that reflect integrative accumulation of selenium over time and space in fish population(s) at a given site.

## ***Selenium Technical Support Materials***

EPA has prepared a four-volume set of documents to provide recommendations to states, authorized tribes, and other agencies for implementing WQC based on the national CWA section 304(a) recommended selenium criterion.<sup>10</sup> These four documents constitute the Technical Support Materials for EPA's *Aquatic Life Ambient Water Quality Criterion for Selenium–Freshwater 2016*.<sup>11</sup> Each document of the set focuses on a specific aspect of implementation of the national CWA section 304(a) recommended selenium criterion. Together, these four EPA documents provide information that will assist states and authorized tribes with adopting WQC based on EPA's CWA section 304(a) recommended selenium criterion and implementing it in various CWA programs.

- 1) *Technical Support for Adopting and Implementing EPA's Selenium 2016 Criterion in Water Quality Standards, Draft*: provides recommendations for the adoption and implementation of the national CWA section 304(a) recommended selenium criterion, including the various flexibilities available to states and tribes using WQS tools.
- 2) *Technical Support for Fish Tissue Monitoring for Implementation of EPA's 2016 Selenium Criterion, Draft*: provides an overview on how to establish or enhance existing fish tissue monitoring programs to facilitate implementation of the fish tissue-based criterion elements in the national CWA section 304(a) recommended selenium criterion.
- 3) *Frequently Asked Questions: Implementing Water Quality Standards Based on EPA's 2016 Recommended Selenium Criterion in Clean Water Act Section 402 NPDES Permits, Draft*: is intended to help National Pollutant Discharge Elimination System (NPDES) permit writers understand what permitting guidance (i.e., state or tribal implementation procedures) may be appropriate to implement state and authorized tribal WQS based on EPA's CWA section 304(a) recommended selenium criterion. This set of FAQs also provides recommendations on how to establish water quality-based effluent limits (WQBELs) in NPDES permits.
- 4) *Frequently Asked Questions (FAQs): Implementing the 2016 Selenium Criterion in Clean Water Act Sections 303(d) and 305(b) Assessment, Listing, and Total Maximum Daily Load (TMDL) Programs, Draft*: provides information on how to complete assessments, list impaired waters, and develop TMDLs based on EPA approved WQS that adhere to EPA's national CWA section 304(a) recommended selenium criterion, including all four elements.

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<sup>10</sup> USEPA. 2021. *2021 Revision to: Aquatic Life Ambient Water Quality Criterion for Selenium–Freshwater 2016*. EPA 822-R-21-006. U.S. Environmental Protection Agency, Office of Water, Washington, DC. <https://www.epa.gov/system/files/documents/2021-08/selenium-freshwater2016-2021-revision.pdf>

<sup>11</sup> Ibid.

## Q1: How should states and authorized tribes implement the national CWA section 304(a) recommended selenium criterion in their assessment and CWA section 303(d) listing programs?

**A1:** The national CWA section 304(a) recommended selenium criterion is structured to enable assessment of waterbodies using existing and readily available water quality-related data and information (collectively referred to as data for the remainder of this document) for any element of the criterion. Table 1 provides an assessment matrix indicating whether the available data supports an impairment determination for nine aquatic life use assessment scenarios using the recommended criterion. Each assessment scenario is further explained following the table. Note that the nine scenarios assume that the waterbody is in steady-state with any selenium sources. Information on evaluating existing and readily available data for assessment purposes is discussed in Q2. Information on performing assessments for waterbodies not in steady-state<sup>12, 13</sup> with selenium sources is provided in Question 10.

### Assessment Scenario Descriptions

Assessment scenarios 1 through 6 cover water quality situations for which data are available to assess the fish tissue component and data are either available, not available, or insufficient to assess the water column component. For purposes of this document the word “component” is used to refer to the categories of data that can be used to make an assessment – fish tissue and water column. Each of these categories has corresponding elements of the criterion associated with them, as described in Table 1.

Scenarios 1, 2, and 3: Available data indicate that the waterbody does not exceed the fish tissue component. The recommended criterion is structured such that the fish tissue criterion elements supersede the water column criterion elements. Hence, if the results for the fish tissue and water column components do not agree or if water column data are insufficient or not available, the assessment decision should be based on results for the fish tissue component. The national CWA section 304(a) recommended selenium criterion is met in all three scenarios.

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<sup>12</sup> For the purposes of the national CWA section 304(a) recommended selenium criterion, steady-state refers to conditions where sufficient time has passed after the introduction of a new or increased discharge of selenium into a water body so that fish tissue concentrations of selenium are no longer increasing. An organism is in steady-state when the rates of chemical uptake and depuration are equal and tissue concentrations remain constant over time. The definition does not apply to the discussion of steady-state modeling or conditions in the “Technical Support Document for Water Quality-based Toxics Control” (EPA/505/2-90-001, March 1991). [www.epa.gov/npdes/pubs/owm0264.pdf](http://www.epa.gov/npdes/pubs/owm0264.pdf).

<sup>13</sup> EPA’s *Aquatic Life Ambient Water Quality Criterion for Selenium–Freshwater 2016* indicates that, after new selenium inputs are added to the waterbody, “EPA estimates that the concentration of selenium in fish tissue will not reach steady-state for several months in lotic systems and longer time periods (e.g., 2–3 years) in lentic systems. Achievement of steady-state in an aquatic system also depends on the hydrodynamics of the aquatic system, (particularly reservoirs with multiple riverine inputs), the location of the selenium input and the particular food web. EPA expects the time needed to achieve steady-state with new or increased selenium inputs to be site-specific.” [www.epa.gov/sites/production/files/2016-07/documents/aquatic\\_life\\_awqc\\_for\\_selenium\\_-\\_freshwater\\_2016.pdf](http://www.epa.gov/sites/production/files/2016-07/documents/aquatic_life_awqc_for_selenium_-_freshwater_2016.pdf).

**Table 2. Matrix of Assessment Scenarios for the National CWA Section 304(a) Recommended Selenium Criterion<sup>1</sup>**

		Water Column Component <sup>5</sup>		
		Not Exceeded	Exceeded	Insufficient or Not Available
Fish Tissue Component <sup>2,3,4</sup>	Not Exceeded	(Scenario 1) Criterion Met	(Scenario 2) Criterion Met	(Scenario 3) Criterion Met
	Exceeded	(Scenario 4) Criterion Not Met	(Scenario 5) Criterion Not Met	(Scenario 6) Criterion Not Met
	Insufficient or Not Available	(Scenario 7) Criterion Met	(Scenario 8) Criterion Not Met	(Scenario 9) Not Assessed

Notes: <sup>1</sup> Decisions assume steady-state conditions.

<sup>2</sup> Fish tissue component includes the following two criterion elements: (a) fish egg-ovary and (b) fish whole-body and/or muscle tissue.

<sup>3</sup> There is no primacy between fish whole-body and muscle criterion elements.

<sup>4</sup> The fish egg-ovary criterion element supersedes the fish whole-body and/or muscle criterion element when both types of data are available.

<sup>5</sup> Water column component includes the following two criterion elements: (a) monthly average exposure and (b) intermittent exposure criterion elements. The duration component of both of these elements applies to any 30-day period.

Scenarios 4, 5, and 6: Available data indicate that the waterbody exceeds the fish tissue component. The recommended criterion is structured such that the fish tissue criterion elements supersede the water column criterion elements. Hence, if the results for the fish tissue and water column components do not agree or if water column data are insufficient or not available, the assessment decision should be based on the results for the fish tissue component. The national CWA section 304(a) recommended selenium criterion is not met in all three scenarios and the waterbody-pollutant combination is impaired.

Note that the national CWA section 304(a) recommended selenium criterion is structured such that the fish egg-ovary criterion element supersedes the fish whole-body and/or muscle criterion element. Hence, if the results for the fish egg-ovary criterion element and the fish whole-body and/or muscle criterion elements do not agree, the assessment for the fish tissue component should be based on the results for the fish egg-ovary criterion element.

Scenarios 7 through 9 cover water quality assessment situations for which data are not available to assess the fish tissue component and data are either available, not available, or insufficient to assess the water column component.

Scenario 7: Available data indicate that the waterbody does not exceed the water column component and data are insufficient or not available to assess the fish tissue component. The recommended criterion is structured such that water quality assessments can be made in the absence of fish tissue data using the water column criterion elements of the

criterion. The national CWA section 304(a) recommended selenium criterion is met in this scenario.

**Scenario 8:** Available data indicate that the water column component is exceeded and data are insufficient or not available to assess the fish tissue component. The national CWA section 304(a) recommended selenium criterion is not met in this scenario and the waterbody-pollutant combination is impaired.

**Scenario 9:** Data are insufficient or not available to assess the water column and the fish tissue components. Therefore, the national CWA section 304(a) recommended selenium criterion cannot be assessed. EPA recommends that states and authorized tribes collect fish tissue and/or water column data so that an assessment decision can be made.

**Q2: What data should states and authorized tribes assemble and evaluate to complete water quality assessments with the national CWA section 304(a) recommended selenium criterion?**

**A2:** States and authorized tribes are required under Title 40 of the *Code of Federal Regulations* (CFR) section 130.7(b)(5) to assemble and evaluate all existing and readily available water quality-related data and information when conducting water quality assessments to determine which waters belong on their CWA section 303(d) lists. To complete water quality assessments with the national CWA section 304(a) recommended selenium criterion, states and authorized tribes should assemble and evaluate all existing and readily available water column and fish tissue data and information relevant to their jurisdictions, including such data and information collected by other stakeholders. The extent to which a state or authorized tribe uses the data and information to make an assessment determination is based on that evaluation. A state or authorized tribe must provide a technical, science-based rationale for not using certain data and information to conduct water quality assessments under section 40 C.F.R. 130.7(b)(6)(iii).

**Q3: How should states and authorized tribes describe their assessment methodology for evaluating selenium data?**

**A3:** States and authorized tribes are required under Title 40 of the *Code of Federal Regulations* section 130.7(b)(6)(i) to submit to EPA Regional Administrator a “description of the methodology used to develop the list” as part of their 303(d) list submissions. An assessment methodology constitutes the decision-making process that a state or authorized tribe uses to determine the water quality attainment status of waters within their jurisdiction. The methodology should describe how data are evaluated and used to make water quality attainment determinations, including data quality, quantity, and representativeness considerations. Additional information regarding data quality, quantity, and representativeness considerations are available in EPA’s Integrated Reporting memo for the 2006 reporting cycle. In addition, if a state or authorized tribe decides not to rely on certain available information and data in making listing decisions, it must provide a technical, science-based rationale consistent with 40 CFR

130.7(b))(6)(iii)<sup>14</sup>. EPA encourages states and authorized tribes to make the assessment methodology available to the public for review and comment prior to, or along with, solicitations for data. Such engagement helps facilitate stakeholder input to the state's or authorized tribe's assessment of water quality status, including assessments for selenium.

#### Q4: Should states and authorized tribes include the collection of fish tissue and water column data in their monitoring programs to assess for selenium?

**A4:** The national CWA section 304(a) recommended selenium criterion provides states and authorized tribes flexibility in how they design their monitoring plans for selenium. This flexibility stems from the fact that both the fish tissue and water column criterion elements are designed to protect against chronic selenium effects. States and authorized tribes should consider a variety of factors when deciding how to monitor for selenium, including assessment and implementation needs, representativeness of the results, available resources, and public input.

When possible, EPA recommends that states and authorized tribes collect fish tissue data to support assessments of the recommended selenium criterion. Fish tissue data reflect integrative accumulation of selenium over time and space in the fish (see Section 2.7.6 of EPA's *Aquatic Life Ambient Water Quality Criterion for Selenium–Freshwater 2016*).<sup>15</sup> Measurements of selenium in fish tissue are most closely linked to the chronic adverse effects of selenium, since chronic selenium toxicity is based on the food-chain bioaccumulation route, not a direct waterborne route.

States and authorized tribes that want to collect fish tissue data should take into consideration species specific factors such as selenium sensitivity, bioaccumulation, mobility (including anadromous and potamodromous species), spawning period, and fish stocking rates when designing their monitoring plan. The document *Technical Support for Fish Tissue Monitoring for Implementation of EPA's 2016 Selenium Criterion, Draft*<sup>16</sup> provides additional information to support the collection, evaluation, and assessment of fish tissue data for selenium. As discussed in Section 3.1, many states and authorized tribes have existing fish tissue monitoring programs that can be leveraged to collect fish tissue data to assess against the fish tissue criterion elements of the recommended selenium criterion.

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<sup>14</sup> USEPA. 2005. Guidance for 2006 Assessment, Listing and Reporting Requirements Pursuant to Sections 303(d), 305(b) and 314 of the Clean Water Act. <https://www.epa.gov/sites/production/files/2015-10/documents/2006irg-report.pdf>

<sup>15</sup> USEPA. 2016. *Aquatic Life Ambient Water Quality Criterion for Selenium–Freshwater 2016*. EPA 822-R-16-006. U.S. Environmental Protection Agency, Office of Water, Office of Science and Technology, Washington, DC, [https://www.epa.gov/sites/production/files/2016-07/documents/aquatic\\_life\\_awqc\\_for\\_selenium\\_freshwater\\_2016.pdf](https://www.epa.gov/sites/production/files/2016-07/documents/aquatic_life_awqc_for_selenium_freshwater_2016.pdf).

<sup>16</sup> USEPA. 2021. *Technical Support for Fish Tissue Monitoring for Implementation of EPA's 2016 Selenium Criterion*. Draft. 823-D-21-002. U.S. Environmental Protection Agency, Office of Water, Washington, DC. <https://www.epa.gov/wqc/aquatic-life-criterion-selenium>

**Q5: How should states and authorized tribes complete assessments and CWA section 303(d) listings for waterbodies that only have selenium water column data?**

**A5:** The national CWA section 304(a) recommended selenium criterion is structured to enable assessment of waterbodies with data related to any element of the criterion. Hence, states and authorized tribes that adopt the national CWA section 304(a) recommended selenium criterion should complete water quality assessments for waterbodies that only have selenium water column data (and no selenium fish tissue data). Additional information about completing assessments for these scenarios is available in Q1 (see Scenarios 7 and 8). After a waterbody is added to a CWA section 303(d) list based on water column data alone, states and authorized tribes may consider collecting fish tissue data to confirm the assessment determination before developing a water quality management plan (e.g., TMDL).

**Q6: How should states and authorized tribes complete selenium assessments and CWA section 303(d) listings for *fishless waters*?**

**A6:** The national CWA section 304(a) recommended selenium criterion is structured to enable assessment of waterbodies with data related to any element of the criterion. Hence, states and authorized tribes that adopt the national CWA section 304(a) recommended selenium criterion should complete water quality assessments using the water column criterion elements for fishless waters.<sup>17</sup> Additional information about completing assessments for these scenarios is available in Q1 (see Scenarios 7 through 9).

Note that the national CWA section 304(a) recommended selenium criterion is designed to protect all freshwater aquatic life, including populations of fish, amphibians, aquatic invertebrates, and plants. The criterion elements were derived from fish toxicity values to be protective of the entire aquatic community, not solely fish species. The criterion elements, including the water quality criterion elements, are designed to protect aquatic life from the chronic effects of exposure to selenium in waters both inhabited by fish and not inhabited by fish.

**Q7: How should states and authorized tribes complete selenium assessments and CWA section 303(d) listings when there are data for multiple fish species?**

**A7:** The national CWA section 304(a) recommended selenium criterion is designed to protect all freshwater aquatic life. Hence, if available data and information from one or more fish species for a waterbody exceeds the criterion, then the criterion is not met and the waterbody-pollutant combination is impaired. States and authorized tribes should not composite or average data from

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<sup>17</sup> EPA describes *fishless waters* as waters with insufficient instream habitat and/or flow to support a population of any fish species on a continuing basis, or waters that once supported populations of one or more fish species but no longer support fish (e.g., extirpation) due to temporary or permanent changes in water quality (e.g., selenium pollution), flow, or instream habitat.

multiple species. Also, the hierarchical elements of the fish tissue component of the criterion (i.e., egg-ovary data supersedes muscle/whole-body) apply within each fish species. States and authorized tribes should not apply the hierarchy across species, as this would be inconsistent with the procedure used to derive the fish tissue element of the criterion<sup>18</sup>, which used species-specific conversion factors to calculate a toxicity value.

**Q8:** How should states and authorized tribes complete selenium assessments and CWA section 303(d) listings when there are multiple samples for a single fish species?

**A8:** States and authorized tribes have flexibility on how to evaluate individual and composite samples for a single fish species. The state's or authorized tribe's assessment methodology should document the decision-making process for this scenario (see Q3). As part of the methodology, the state or authorized tribe should discuss the process and rationale for combining and assessing data from individual and/or composite samples of the same species, including how the time and location of sample collection and size of fish samples were considered. Additional information on approaches and factors to consider in collecting, evaluating, and assessing data from individual or composite fish tissue samples is provided in the document *Technical Support for Fish Tissue Monitoring for Implementation of EPA's 2016 Selenium Criterion, Draft*<sup>19</sup>.

**Q9:** How should the selenium fish tissue frequency of “not to be exceeded” be applied in the assessment and CWA section 303(d) listing programs?

**A9:** The fish tissue criterion elements of the national CWA section 304(a) recommended selenium criterion each have a frequency of “not to be exceeded.” As explained in the criterion document, this frequency was selected because it may take a prolonged period for fish communities to recover from exposure to elevated levels of selenium. EPA's current recommendation of a “once in three years on average” return frequency for aquatic life criteria is not adequate for selenium (see Section 2.7.7 of EPA's *Aquatic Life Ambient Water Quality Criterion for Selenium–Freshwater 2016* for additional information)<sup>20</sup>. For assessment and CWA section 303(d) listing purposes, assessment methodologies of states and authorized tribes should be consistent with their applicable water quality standards, including the magnitude, duration and frequency. Hence, for states and authorized tribes that adopt the national CWA section 304(a)

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<sup>18</sup> USEPA. 2021. *2021 Revision to: Aquatic Life Ambient Water Quality Criterion for Selenium–Freshwater 2016*. EPA 822-R-21-006. U.S. Environmental Protection Agency, Office of Water, Washington, DC. <https://www.epa.gov/system/files/documents/2021-08/selenium-freshwater2016-2021-revision.pdf>

<sup>19</sup> USEPA. 2021. *Technical Support for Fish Tissue Monitoring for Implementation of EPA's 2016 Selenium Criterion*. Draft. 823-D-21-002. U.S. Environmental Protection Agency, Office of Water, Washington, DC. <https://www.epa.gov/wqc/aquatic-life-criterion-selenium>

<sup>20</sup> USEPA. 2021. *2021 Revision to: Aquatic Life Ambient Water Quality Criterion for Selenium–Freshwater 2016*. EPA 822-R-21-006. U.S. Environmental Protection Agency, Office of Water, Washington, DC. <https://www.epa.gov/system/files/documents/2021-08/selenium-freshwater2016-2021-revision.pdf>



recommended selenium criterion, their assessment methodologies should be consistent with the magnitude, duration and frequency component of the recommendation.

### Q10: How should states and authorized tribes complete assessments and CWA section 303(d) listings when steady-state conditions are not present?

**A10:** The national CWA section 304(a) recommended selenium criterion is structured to address circumstances when steady-state conditions are present or not present in the waterbody (see Q1 for the assessment scenario matrix for steady-state conditions). Steady-state conditions may not be present in the water body when new inputs<sup>21</sup> are introduced that will likely result in higher concentrations of selenium in the food web and a relatively slow increase in the selenium concentration in fish tissue. According to the national CWA section 304(a) recommended selenium criterion, the fish tissue criterion elements supersede the water column criterion elements when the waterbody is in a steady-state condition. When the waterbody is not in steady-state, the waterbody is not meeting the criterion and is considered impaired if either the fish tissue or water column criterion elements are exceeded.<sup>22</sup>

### Q11: How should states and authorized tribes implement the selenium water column intermittent element in assessments and CWA section 303(d) listings?

**A11:** The water column component of the national CWA section 304(a) recommended selenium criterion includes both an intermittent criterion element and a monthly average water column criterion element (i.e., 30-day average). The intermittent criterion element is a calculation based on the known ambient concentration, the monthly average exposure water column criterion element, and the fraction of any 30-day period during which elevated selenium concentrations occur. As explained in section 3.3 of EPA's *Aquatic Life Ambient Water Quality Criterion for Selenium–Freshwater 2016*<sup>23</sup>, the intermittent criterion element is a re-expression of the chronic 30-day average water column criterion element and will yield the same level of protection as the monthly average exposure criterion element, provided that the equation uses the average of the concentrations occurring for (1) the fraction of time defined as being intermittently elevated and (2) the remaining time defined as being background.

The intermittent criterion element can only be exceeded under the same conditions that would have caused the monthly average exposure criterion element to be exceeded. Thus, evaluating data against the intermittent element and the monthly average exposure criterion element will always result in the same assessment decision. As such, state and authorized tribes may find it

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<sup>21</sup> EPA describes new inputs as new activities resulting in the release of selenium into a lentic or lotic aquatic system.

<sup>22</sup> USEPA. 2021. *2021 Revision to: Aquatic Life Ambient Water Quality Criterion for Selenium–Freshwater 2016*. EPA 822-R-21-006. U.S. Environmental Protection Agency, Office of Water, Washington, DC. <https://www.epa.gov/system/files/documents/2021-08/selenium-freshwater2016-2021-revision.pdf>

<sup>23</sup> Ibid

more straightforward to assess the water column component of the recommended criterion using the monthly average criterion element because it does not require knowledge of the background conditions or number of days with an intermittent spike.

## Q12: How can states and authorized tribes remove selenium impairments from their CWA section 303(d) lists?

**A12:** As with any applicable water quality standard, states and authorized tribes that adopt the national CWA section 304(a) recommended selenium criterion will make assessment decisions based on an evaluation of existing and readily available water quality data against the criterion and accompanying assessment methodology. The assessment decision informs whether a waterbody should be identified as impaired and included on the state's or authorized tribe's CWA section 303(d) list and assigned a priority ranking for TMDL development. Selenium impairments included on the CWA section 303(d) list may be excluded from subsequent lists (sometimes described as "delisting") for several reasons, including: (a) the water quality standard is met based on the criterion and accompanying assessment methodology, (b) there were flaws in the original listing, (c) a TMDL was established and approved by the EPA, or (d) other point source or nonpoint source controls are expected to result in the waterbody meeting water quality standards.

## Q13: Can states and authorized tribes develop a water column criterion element for selenium that considers site-specific conditions for assessment, 303(d) listing, and TMDL development?

**A13:** States and authorized tribes can take one of two approaches for developing a water column criterion element for selenium that considers site-specific conditions. Under the first approach, if a state or authorized tribe thinks that the default national water column criterion element is not appropriate for a waterbody, states and authorized tribes can choose to adopt into their WQS and submit to EPA for approval a site-specific water column criterion element developed using the procedures provided in Appendix K of the national CWA section 304(a) recommended selenium criterion<sup>24</sup> or another scientifically defensible method that is protective of the aquatic life use. Under the second approach, states and authorized tribes can choose to adopt into their WQS and submit to EPA for approval a set of procedures to translate the fish tissue criterion elements into a site-specific water column criterion element. This is considered a performance-based approach to site-specific criteria development.<sup>25</sup> Information on both approaches is provided in sections

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<sup>24</sup> Ibid.

<sup>25</sup> In addition to the four-part criterion, states or authorized tribes may want to adopt a method to derive site-specific water column criterion elements, referred to by EPA in 2000 as a "performance-based approach". EPA first formalized the concept of a performance-based approach for a WQS in the preamble of the rule *EPA Review and Approval of State and Tribal Water Quality Standards*. Here EPA describes this approach as a WQS that is a transparent process rather than a specific outcome. The state or authorized tribe can adopt a process, such as a criterion derivation methodology, rather than a specific outcome, such as a concentration of a pollutant. If a state or authorized tribe adopts a process or methodology that is sufficiently detailed and has suitable safeguards that ensure predictable, repeatable outcomes, EPA can approve that process as a WQS and this approval would also serve for CWA purposes as the approval of each outcome generated from following that process or method.

2.2.1 and 2.2.2 of *Technical Support for Adopting and Implementing EPA's 2016 Selenium Criterion in Water Quality Standards, Draft*.<sup>26</sup>

States and authorized tribes should consider which of the two approaches they want to use when adopting the national CWA section 304(a) recommended selenium criterion. For example, the first approach (i.e., EPA approved site-specific criterion) is more straightforward to apply in assessment, 303(d) listing, and TMDL development and will likely reduce workload on those programs. Furthermore, the opportunity for public comment on the site-specific water column criterion element would occur in response to a single CWA section 303(c) action. The second approach (i.e., performance-based) facilitates an opportunity for states and authorized tribes to adaptively derive a site-specific water column criterion element to account for the most up-to-date data for the waterbody using the procedures in the EPA-approved criterion. When a performance-based approach is used, however, more coordination will likely be needed between the CWA implementing programs to consistently employ such water column criterion elements, and the opportunity for public comment on the translated site-specific water column criterion element would occur in response to different and multiple program actions (e.g., assessment decisions, or development of TMDLs or permit limits).

**Q14: Which criterion elements of the recommended selenium criterion should be used to develop TMDLs?**

**A14:** States and authorized tribes that adopt the national CWA section 304(a) recommended selenium criterion should consider developing TMDLs for selenium based on the monthly average exposure water column criterion element or a site-specific water column criterion element developed through one of the two approaches described in Q13. As discussed in Q1, four scenarios (i.e., 4, 5, 6, and 8 in Table 1) exist for which a waterbody can be assessed as impaired. For three of the scenarios (i.e., 5, 6, and 8 in Table 1), states and authorized tribes should consider using the monthly average exposure water column criterion element to develop TMDLs. EPA recommends the approach of using the monthly average exposure water column criterion element for these scenarios because it was derived to ensure adequate protection of the fish tissue criterion elements of the criterion. However, for scenario 4 (wherein available data indicate that the fish tissue criterion element of the criterion is exceeded and the water column criterion element is not exceeded), states and authorized tribes should consider developing a site-specific water column criterion element and use it for developing the TMDL. Using the monthly average exposure water column criterion element under scenario 4 to develop the TMDL could result in a loading capacity for selenium that exceeds the existing load, which is already resulting in an exceedance of the fish tissue criterion elements of the criterion in the waterbody. For this scenario states and authorized tribes should consider developing a site-specific water column criterion element that would provide adequate protection of the fish tissue criterion elements of the criterion.

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<sup>26</sup> USEPA. 2021. *Technical Support for Adopting and Implementing EPA's 2016 Selenium Criterion in Water Quality Standards*. Draft. EPA 823-D-21-001. U.S. Environmental Protection Agency, Office of Water, Washington, DC. <https://www.epa.gov/wqc/aquatic-life-criterion-selenium>

## Q15: How should TMDLs account for the intermittent criterion element of the national CWA section 304(a) recommended selenium criterion?

**A15:** For states and authorized tribes that adopt the national CWA section 304(a) recommended selenium criterion, developing TMDLs based on the monthly average exposure water column criterion element of the criterion would also address the intermittent water column criterion element. Section 3.3 of EPA's *Aquatic Life Ambient Water Quality Criterion for Selenium—Freshwater 2016* explains that the intermittent criterion element is a re-expression of the chronic 30-day average water column criterion element of the criterion.<sup>27</sup> As such, the monthly average exposure water column criterion element and the intermittent criterion element of the criterion are intended to provide the same level of protection of the fish tissue criterion elements of the criterion.

Permit writers develop water quality-based effluent limitations (WQBELs) to meet the state's or authorized tribe's EPA-approved water quality standards. Hence, for states and authorized tribes that adopt the national CWA section 304(a) recommended selenium criterion, the permitting authorities would use the water column criterion element (either monthly average or intermittent, as appropriate) and any available TMDL wasteload allocations to establish NPDES permit limits. Because the intermittent criterion element is a re-expression of the monthly average water column criterion element, permits that include an intermittent criterion element would be consistent with wasteload allocations in TMDLs that are based on the monthly average expression water column criterion element.

## Q16: Does EPA have recommendations that address whether a receiving waterbody should be considered lentic or lotic for assessments and 303(d) listings?

**A17:** The national CWA section 304(a) recommended selenium criterion includes water column criterion element values for both lotic and lentic freshwater systems. Generally, classifications of fresh waters into lotic or lentic categories are made by the state or authorized tribe, based on site-specific information. States and authorized tribes should ensure that they use transparent, scientifically defensible methods to classify receiving waterbodies appropriately. Reservoirs with extended residence times are more likely to demonstrate bioaccumulation dynamics that are lentic in nature. Section 3.2.4 in EPA's *Aquatic Life Ambient Water Quality Criterion for Selenium—Freshwater 2016* provides further discussion of categories of fresh water. A site-specific study or use of available hydrology information might be necessary to determine the residence time of the waterbody so that the application of the lentic or lotic water column criterion element can be appropriately applied in assessments and CWA section 303(d) listings.

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<sup>27</sup> USEPA. 2021. *2021 Revision to: Aquatic Life Ambient Water Quality Criterion for Selenium—Freshwater 2016*. EPA 822-R-21-006. U.S. Environmental Protection Agency, Office of Water, Washington, DC. <https://www.epa.gov/system/files/documents/2021-08/selenium-freshwater2016-2021-revision.pdf>