

**Frequently Asked Questions (FAQs): Implementing
WQS that Include Elements Similar or Identical to
EPA's 2016 Selenium Criterion in Clean Water Act
Section 402 NPDES Programs**

Draft

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This document supports Clean Water Act (CWA) regulators in states, authorized tribes, and territories in implementing EPA’s four-part selenium water quality criterion (WQC)¹ in EPA’s *Aquatic Life Ambient Water Quality Criterion for Selenium–Freshwater 2016*² as it relates to the CWA section 402 National Pollutant Discharge Elimination System (NPDES) Programs. A summary of the recommended criterion is provided in Attachment 1.

This set of FAQs provides information on how to establish water quality-based effluent limits (WQBELs) in NPDES permits. While this document cites statutes and regulations that contain requirements applicable to NPDES permitting, it does not impose legally binding requirements on EPA, states, authorized tribes, other regulatory authorities, or the regulated community and its content might not apply to a particular situation based upon the circumstances. EPA, states, authorized tribes, and other decision makers retain the discretion to adopt approaches on a case-by-case basis that differ from those provided in this document as appropriate and consistent with statutory and regulatory requirements. EPA could update this document as new information becomes available. In addition to this document, EPA has other documents which provide considerations and recommendations on implementing the selenium criterion and can be found at EPA’s selenium website: <https://www.epa.gov/wqc/aquatic-life-criterion-selenium>. Note: For state or authorized tribal WQS that do not include elements similar or identical to EPA’s 2016 recommended selenium criterion, EPA will assess the need for alternative state- or authorized tribal-specific implementation permitting procedures to ensure consistency with the NPDES permitting requirements at Title 40 of the Code of Federal Regulations (CFR) section 122.44.

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¹ Reference to a *four-part criterion* or *four-part selenium criterion* assumes adoption and EPA approval of a four-part aquatic life WQS for selenium that includes elements similar or identical to EPA’s 2016 selenium criterion.

² USEPA (U.S. Environmental Protection Agency). 2016. *Aquatic Life Ambient Water Quality Criterion for Selenium–Freshwater 2016*. EPA 822-R-16-006. U.S. Environmental Protection Agency, Office of Water, Washington, DC. <https://www.epa.gov/wqc/aquatic-life-criterion-selenium-documents>.

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This document addresses questions about National Pollutant Discharge Elimination System (NPDES) permitting based on state or authorized tribal water quality standards (WQS) that include elements similar or identical to EPA's 2016 water quality criterion (WQC) for selenium.³ The four-part criterion—as summarized in Attachment 1—replaces EPA's 1987 recommended selenium WQC. Attachment 1 includes a reference to a performance-based approach that is based on recommendations for implementing selenium WQC in regulatory programs. The performance-based approach is defined in EPA's *Technical Support for Adopting and Implementing EPA's 2016 Selenium Criterion in Water Quality Standards* at Section 1.2.2 as: an approach to developing site-specific criterion in which, “States and authorized tribes can choose to adopt into their WQS and submit to EPA a set of procedures to facilitate the translation of the fish tissue criterion concentration elements into site-specific water concentration values.”

This document is intended to help EPA, state, authorized tribes, and territorial NPDES permit writers understand how permitting procedures might be refined where states adopt EPA's 2016 selenium criterion (as summarized in Attachment 1), which includes the following elements of the four-part criterion⁴: (1) a fish egg-ovary element; (2) a fish whole-body and/or muscle element; (3) a water column element (one value for lentic and one value for lotic aquatic systems); and (4) a water column intermittent element to account for potential chronic effects from short-term exposures (one value for lentic and one value for lotic aquatic systems).

1. Identifying the Applicable Selenium WQS to Implement in the NPDES Permit

Q1-1: Which selenium criterion should the permit writer use for conducting a reasonable potential (RP) determination or developing effluent limits in an NPDES permit?

A1-1: A state or authorized tribe might have adopted a selenium aquatic life criterion as a component of their WQS based on EPA's 2016 selenium criterion; or EPA's 1987 selenium criterion, WQC promulgated pursuant to 40 CFR Part 132 (60 FR 15387, March 23, 1995); or other scientifically defensible criterion. The state's or authorized tribe's selenium criterion might have been adopted either on a site-specific basis or on a statewide or tribe-wide basis and generally will be part of the state's or authorized tribe's EPA-approved WQS to protect applicable designated uses of the receiving water. Permit writers must develop WQBELs, where RP has been demonstrated, to meet the state's or authorized tribe's EPA-approved standards as required in Clean Water Act (CWA) section 301(b)(1)(C) and NPDES regulations at 40 CFR 122.44(d). In addition, a state or authorized tribal permit writer might have authority under state statute or regulation or tribal law to include WQBELs necessary to meet more stringent state or authorized tribal WQS that have not yet been approved by EPA. EPA permit writers also must include more stringent conditions necessary to meet other appropriate requirement(s) under state or tribal law if a state or authorized tribe specified such conditions in a CWA 401 certification.

³ USEPA (U.S. Environmental Protection Agency). 2016. *Aquatic Life Ambient Water Quality Criterion for Selenium—Freshwater 2016*. EPA 822-R-16-006. U.S. Environmental Protection Agency, Office of Water, Washington, DC. <https://www.epa.gov/wqc/aquatic-life-criterion-selenium-documents>.

⁴ Reference to a *four-part criterion* or *four-part selenium criterion* assumes state, authorized tribe, and territorial adoption of a four-part aquatic life WQS for selenium that includes elements similar or identical to EPA's 2016 selenium criterion.

In addition, there may be EPA-promulgated WQS for certain waters. For waters covered by EPA's federally promulgated WQS, the permit writer must develop WQBELs to meet the WQS found in 40 CFR Part 131, Subpart D.

EPA's approved state and authorized tribal WQS are available at <http://water.epa.gov/scitech/swguidance/standards/wqslibrary/index.cfm>.

Q1-2: Which elements of a four-part criterion for selenium should be used when implementing WQS through the NPDES permits program?

A1-2: Any of the elements of a *four-part criterion* for selenium can be used to assess the need for and to establish effluent limits as stringent as necessary to meet the applicable selenium criterion. The flowchart provided in Attachment 2 presents an approach that considers both the fish tissue and water column elements of the criterion. Specific questions about using the four-part criterion to assess RP and WQBEL development are provided in sections 3 and 4 of this document.

Q1-3: Does state or authorized tribal adoption of a site-specific egg-ovary element that differs from EPA's 2016 selenium criterion require EPA approval under CWA 303(c) before using the site-specific element in NPDES permitting?

A1-3: Site-specific elements that differ from the egg-ovary element of EPA's 2016 selenium criterion would require EPA approval under CWA 303(c). EPA review and approval are important because WQS are not applicable for CWA purposes, including NPDES permitting, until EPA has approved them (40 CFR 131.21(c)). [**NOTE:** As indicated in Q1-1, a state or authorized tribal permit writer might have authority under state statute or regulation or tribal law to include a WQBEL necessary to meet more stringent state or authorized tribal WQS that have not yet been approved by EPA.] Since all of the other elements in EPA's 2016 selenium criterion are derived from the egg-ovary element, any state or authorized tribe that adopts a site-specific egg-ovary element would need to derive the related whole body/muscle and water column elements from that element and submit them to EPA for review and approval under CWA 303(c) as well. See EPA's *Technical Support for Adopting and Implementing EPA's 2016 Selenium Criterion in Water Quality Standards* for additional discussion on site-specific criterion development.⁵

Q1-4: May permit writers use mixing zones, initial zones of dilution, or dilution factors in NPDES permitting for selenium?

A1-4: EPA recommends in section 5.1.2 of its online *Water Quality Standards Handbook* (<http://www.epa.gov/wqshandbook>) that state and authorized tribal mixing zone policies should carefully consider whether mixing zones are appropriate for bioaccumulative pollutants.⁶ When the state or authorized tribal WQS prohibit or do not authorize mixing zones or consideration of

⁵ USEPA (U.S. Environmental Protection Agency). 2016. *Technical Support for Adopting and Implementing EPA's 2016 Selenium Criterion in Water Quality Standards*. U.S. Environmental Protection Agency, Office of Water, Office of Science and Technology, Washington, DC.

⁶ USEPA (U.S. Environmental Protection Agency). 2014. General Policies. Chapter 5 in *Water Quality Standards Handbook*. EPA 820-B-14-004. U.S. Environmental Protection Agency, Office of Water, Washington, DC. <http://www.epa.gov/wqshandbook>.

dilution for bioaccumulative pollutants such as selenium, and because WQBELs must be as stringent as necessary to meet EPA-approved state or authorized tribal WQS, the permit writer must develop WQBELs that meet those standards at the point of discharge.

If state or authorized tribal WQS allow mixing zones or consideration of dilution for bioaccumulative pollutants such as selenium, the permit writer may use mixing zones or dilution allowances in assessing the need for and deriving WQBELs. In such cases, standards must be met during critical conditions after accounting for allowable dilution or at the edge of the regulatory mixing zone. The permit or fact sheet should describe the geographic extent of the mixing zone or dilution volume allowed under the permit.

Any allowance for dilution or mixing should be made on a case-by-case basis that accounts for site-specific conditions, including effluent flow, stream flow, and ambient pollutant concentrations. In-stream dilution that is often provided in a mixing zone will not be available in cases such as discharges to headwaters of a stream where the discharge makes up the entire stream flow. Additionally, if the ambient concentration of selenium is greater than the criterion, there will be no in-stream dilution available.

Q1-5: If a state or authorized tribe adopts a new WQS before the end of the 5-year permit term, can the permit be modified to ensure that the effluent limit reflects the new standard?

A1-5: EPA regulations at 40 CFR 122.62(a) specify that permits can be modified before the end of the 5-year permit term for *cause*. Cause can include permit reopeners (40 CFR 122.62(a)(7)) and new regulations, including EPA-approved or -promulgated WQS, if requested by the permittee (40 CFR 122.62(a)(3)). Most typically, however, permits are revised to incorporate WQS based on a new criterion at the time of renewal. If the permit writer anticipates the need for new data in advance of reissuing the permit at the end of the 5-year term, CWA section 308 allows EPA to require the permittee to collect information that will be needed for development of the revised permit.

2. NPDES Reasonable Potential (RP) Determinations (Basis for NPDES Permit WQBELs)

Q2-1: Which elements of a four-part criterion for selenium should be used for conducting RP analyses?

A2-1: Because a four-part criterion includes multiple elements, any of the elements of the criterion can be used by the permitting authority to determine whether the discharge causes, has the RP to cause or contributes to an in-stream excursion above the state or authorized tribe's EPA approved WQC. RP is demonstrated for a point source discharge where:

- Fish tissue data collected from a waterbody show an excursion of any of the fish tissue elements of the state's or authorized tribe's EPA-approved WQC (i.e., fish egg-ovary, fish whole-body and/or muscle tissue) and a permitting authority determines that a point source discharge to the waterbody contains selenium; or
- The permitting authority determines that a point source discharge containing selenium causes, has the RP to cause or contributes to an in-stream excursion above any of the water column elements for the state's or authorized tribe's EPA approved WQC.

Note: The absence of fish tissue data or instances in which available fish tissue data do not indicate an excursion of the fish tissue elements of the state's or authorized tribe's EPA-approved selenium WQC does not mean there is no RP. The RP analysis is by design predictive of a potential excursion (presumably before an excursion occurs); thus, even if fish tissue levels are below the applicable fish tissue elements of the state or authorized tribe WQC, the determination should generally evaluate whether there is RP with respect to the water column elements of the standard. [Also see Q2-4 below.]

The flowchart in Attachment 2 summarizes EPA's recommended procedures for conducting RP analyses based on a four-part selenium criterion.

Q2-2: How should a regulatory authority determine the appropriate water column element based on the four-part criterion (e.g., a 30-day chronic element versus an intermittent element) for use in a given NPDES permit?

A2-2: For NPDES-permitted facilities that continuously discharge effluent containing selenium, the water column elements of a four-part criterion—which represent a 30-day average concentration that corresponds to the concentration of selenium in fish tissue estimated to result in a 10 percent effect in fish for a specific waterbody type (lentic or lotic)—should be used in RP analysis and WQBEL development (see also chapter 5 of EPA's *Technical Support Document for Water Quality-based Toxics Control*,⁷ [TSD], March 1991, EPA/505/2-90-001).

For NPDES-permitted discharges that discharge effluent noncontinuously (e.g., some mining discharges), the intermittent element should be used. The intermittent element is calculated using the equations provided in EPA's *Aquatic Life Ambient Water Quality Criterion for Selenium—Freshwater 2016*⁸ (see Attachment 1).

Q2-3: What effluent data would be necessary to assess RP using a four-part criterion?

A2-3: To assess whether the discharge causes, has the RP to cause, or contributes to an in-stream excursion above the water column element of a four-part selenium criterion, effluent data requirements recommended for toxics in section 3.3 of EPA's 1991 TSD (March 1991, EPA/505/2-90-001),⁹ and other NPDES monitoring guidance should be used to identify appropriate monitoring requirements for RP determinations and NPDES permitting. The flowchart presented in Attachment 2 summarizes the options to assess RP based on the different elements of EPA's 2016 selenium criterion and data availability.

⁷ USEPA (U.S. Environmental Protection Agency). 1991. *Technical Support Document for Water Quality-based Toxics Control*. EPA/505/2-90-001. U.S. Environmental Protection Agency, Office of Water, Washington, DC. <http://www.epa.gov/npdes/pubs/owm0264.pdf>.

⁸ USEPA (U.S. Environmental Protection Agency). 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/wqc/aquatic-life-criterion-selenium-documents>.

⁹ USEPA (U.S. Environmental Protection Agency). 1991. *Technical Support Document for Water Quality-based Toxics Control*. EPA/505/2-90-001. U.S. Environmental Protection Agency, Office of Water, Washington, DC. <http://www.epa.gov/npdes/pubs/owm0264.pdf>.

Q2-4: If a state or authorized tribe has sufficient and representative fish tissue data available to demonstrate that selenium levels in fish tissue do not indicate an excursion of the fish tissue elements of the four-part selenium criterion, can that information be used to determine that there is no RP and, thus, no need for a WQBEL?

A2-4: EPA considers that its 2016 selenium criterion's water column element is the most appropriate predictor for whether the discharge causes, has the RP to cause or contributes to an in-stream excursion above the applicable WQC. However, the state or authorized tribe might be able to make the determination that there is no RP if the following conditions exist simultaneously: (1) the sources of selenium are already present in a waterbody and are not expected to increase; (2) the population of fish have been exposed to the existing levels of selenium and the system is determined to be in steady-state (based on scientifically defensible documented data); and (3) relevant and timely collection of fish tissue data, accounting for the duration of the discharge relative to collected fish tissue, demonstrate that the fish tissue levels are significantly below the criterion's fish tissue element.

Q2-5: In cases in which a discharge occurs at a lotic location and downstream waters are lentic waterbody types (e.g., lakes, impoundments), which selenium criterion water column element should be used in RP analysis?

A2-5: EPA's 2016 selenium criterion water column element for lentic waters is more stringent than it is for lotic waters. Therefore, if an NPDES discharge is located in lotic waters upstream of lentic waters, the permit writer would need to ensure that the lentic downstream WQC are protected when conducting RP analysis and in developing WQBELs for selenium (see 40 CFR 122.4(d)).

Water quality and hydrological modeling, as discussed in chapter 4 of EPA's 1991 TSD (March 1991, EPA/505/2-90-001),¹⁰ might be needed to determine potential water column concentrations of selenium in lentic waters downstream and whether there is RP for an excursion above the water column element in the lentic downstream waters. If the RP analyses indicate that the discharge causes, has the RP to cause, or contributes to an in-stream excursion of the lentic water column element downstream, then that water column element should be used as the basis of selenium WQBELs even though the discharge is to the lotic waterbody upstream.

Q2-6: In some cases, it might not be clear whether a receiving waterbody is lentic or lotic in terms of an appropriate selenium water column element (e.g., run-of-the-river reservoirs). Does EPA have recommendations that address whether a receiving waterbody should be considered lentic or lotic for purposes of NPDES RP analysis and permit WQBEL determinations?

A2-6: Generally, classification of fresh waters into lotic or lentic categories are made by the state or authorized tribe. 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, Classifying Categories of Aquatic System, in EPA's *Aquatic Life Ambient Water Quality Criterion for Selenium—Freshwater 2016* provides further discussion of

¹⁰ Ibid.

categories of fresh water.¹¹ 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 value can be applied in a defensible manner for RP analyses.

3. NPDES Permit WQBEL Calculations

Q3-1: Can an NPDES permitting authority using a state- or authorized tribal-adopted standard based on or similar to EPA’s recommended four-part selenium criterion derive selenium NPDES permit WQBELs for a noncontinuous or intermittent effluent discharge containing selenium? How?

A3-1: The intermittent element is intended to provide protection from long-term chronic effects on aquatic life caused by short-term elevation of selenium in aquatic systems (i.e., noncontinuous exposures). It should be calculated based on the number of days a discharge that contains selenium occurs and the equations provided in EPA’s *Aquatic Life Ambient Water Quality Criterion for Selenium—Freshwater 2016* (Attachment 1) that address chronic effects associated with noncontinuous discharges.¹² Permit writers should use those recommendations when determining whether RP exists and to calculate NPDES permit limits when RP has been demonstrated. RP analysis and WQBEL determination should be based on the intermittent value calculated for the potential effects of the discharge to the receiving water.

Q3-2: Can an NPDES permitting authority develop permit limits (WQBELs) for a four-part selenium criterion using the fish tissue element(s) of a four-part criterion (i.e., egg-ovary or whole body and/or muscle) rather than the water column element?

A3-2: States and authorized tribes should use the water column element to develop and establish WQBELs in NPDES permits. As described in EPA’s *Technical Support for Adopting and Implementing EPA’s 2016 Selenium Criterion in Water Quality Standards*,¹³ if a state or authorized tribe believes that the default national water column element is not appropriate for a waterbody, it can develop a site-specific water column element using the procedures provided in Appendix K, Translation of a Selenium Fish Tissue Criterion Element to a Site-Specific Water Column Value, in EPA’s *Aquatic Life Ambient Water Quality Criterion for Selenium—Freshwater 2016*.¹⁴ Any development or use of a site-specific water column value must be consistent with EPA-approved translation procedures in the state’s or authorized tribe’s WQS.

EPA has not developed guidance for calculating or expressing WQBELs directly from a fish tissue-based criterion expression. If a permitting authority were to develop a procedure that

¹¹ USEPA (U.S. Environmental Protection Agency). 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/wqc/aquatic-life-criterion-selenium-documents>.

¹² Ibid.

¹³ USEPA (U.S. Environmental Protection Agency). 2016. *Technical Support for Adopting and Implementing EPA’s 2016 Selenium Criterion in Water Quality Standards*. U.S. Environmental Protection Agency, Office of Water, Washington, DC.

¹⁴ USEPA (U.S. Environmental Protection Agency). 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/wqc/aquatic-life-criterion-selenium-documents>.

derived the WQBEL directly from the fish tissue element(s) of the criterion, any WQBEL developed would have to be consistent with the requirements of CWA 301(b)(1)(C) as well as 40 CFR 122.44(d) and 122.45.

Q3-3: EPA's 2016 selenium criterion does not include an acute expression. Must permits contain both short- and long-term limit expressions?

A3-3: EPA's NPDES permit regulations at 40 CFR 122.45(d)(1) require that, for continuous discharges, all permit limits shall, unless impracticable, be stated as maximum daily and average monthly limitations for all dischargers other than publicly owned treatment works (POTWs), and average weekly and average monthly limitations for POTWs.

Many of EPA's WQC and many EPA-approved state or authorized tribal WQC include only a single criterion expression. The availability of a single criterion value does not restrict or preclude the development of both short- and long-term WQBELs. WQBELs establish *end-of-pipe* effluent quality requirements that ensure compliance with the applicable in-stream ambient criteria. WQBEL calculations typically rely on physical and statistical models that anticipate how the effluent and receiving water comingle and account for factors such as effluent variability and pollutant fate and transport characteristics. Chapter 5 of EPA's TSD provides methods to derive both short- and long-term WQBELs from one or more ambient criteria values with a range of duration components.¹⁵

Q3-4: NPDES regulations require that permit limits for metals be expressed as total recoverable; however selenium is a nonmetal or metalloid. Should selenium be expressed as total recoverable in WQBELs and, if so, how should an NPDES permitting authority translate the dissolved selenium water column element of EPA's 2016 selenium criterion to a total recoverable selenium NPDES permit limit?

A3-4: WQBELs for selenium should be expressed as total recoverable selenium; however, the selenium criterion water column elements are expressed as dissolved selenium. Given that particulate as well as dissolved selenium can have deleterious effects on aquatic life—as discussed in EPA's *Aquatic Life Ambient Water Quality Criterion for Selenium—Freshwater 2016*¹⁶—in the absence of site-specific data, it may be appropriate to use a total recoverable-to-dissolved selenium ratio of 1.00 in determining RP and calculating permit WQBELs for selenium. EPA has provided previous guidance on procedures for translating a dissolved criterion to total recoverable permit limits that also includes recommendations for sampling and analysis (see EPA's document 823-B-96-007, 1996).¹⁷

¹⁵ USEPA (U.S. Environmental Protection Agency). 1991. *Technical Support Document for Water Quality-based Toxics Control*. EPA/505/2-90-001. U.S. Environmental Protection Agency, Office of Water, Washington, DC. <http://www.epa.gov/npdes/pubs/owm0264.pdf>.

¹⁶ USEPA (U.S. Environmental Protection Agency). 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/wqc/aquatic-life-criterion-selenium-documents>.

¹⁷ USEPA (U.S. Environmental Protection Agency). 1996. *The Metals Translator: Guidance For Calculating a Total Recoverable Permit Limit from a Dissolved Criterion*. EPA 823-B-96-007. U.S. Environmental Protection Agency, Office of Water, Washington, DC. https://www3.epa.gov/npdes/pubs/metals_translator.pdf.

4. NPDES Monitoring (Basis for RP and WQBELs, Compliance Determination)

Q4-1: What EPA analytical test methods are recommended for use in analyzing water and fish tissue samples for selenium under EPA's NPDES program?

A4-1: EPA provides analytical test methods approved for measuring selenium for wastewater effluent and sewage sludge at 40 CFR Part 136.3 (also see Appendix L, Analytical Methods for Measuring Selenium, in EPA's *Aquatic Life Ambient Water Quality Criterion for Selenium—Freshwater 2016*).¹⁸

Use of any other method for permit compliance monitoring must first be approved through the alternate test procedures approval process (see 40 CFR 136.4 and 136.5).

For selenium fish tissue sampling, EPA has developed *Technical Support for Fish Tissue Monitoring for Implementation of EPA's 2016 Selenium Criterion*, which describes fish tissue sampling methods and sample collection considerations.¹⁹

5. Compliance and Enforcement of NPDES Permit Requirements

Q5-1: Would a compliance schedule be allowed in an NPDES renewal permit in which a WQBEL is being replaced with a more stringent permit limit based on EPA's 2016 selenium criterion?

A5-1: Possibly. EPA's water quality standards regulations at 40 CFR 131.15 specify that, if a state or authorized tribe intends to authorize the use of schedules of compliance for WQBELs in NPDES permits, that state or authorized tribe must adopt a permit compliance schedule-authorizing provision, and any schedule developed must be consistent with the requirements established for compliance schedules in 40 CFR 122.2 and 122.47.

¹⁸ USEPA (U.S. Environmental Protection Agency). 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/wqc/aquatic-life-criterion-selenium-documents>.

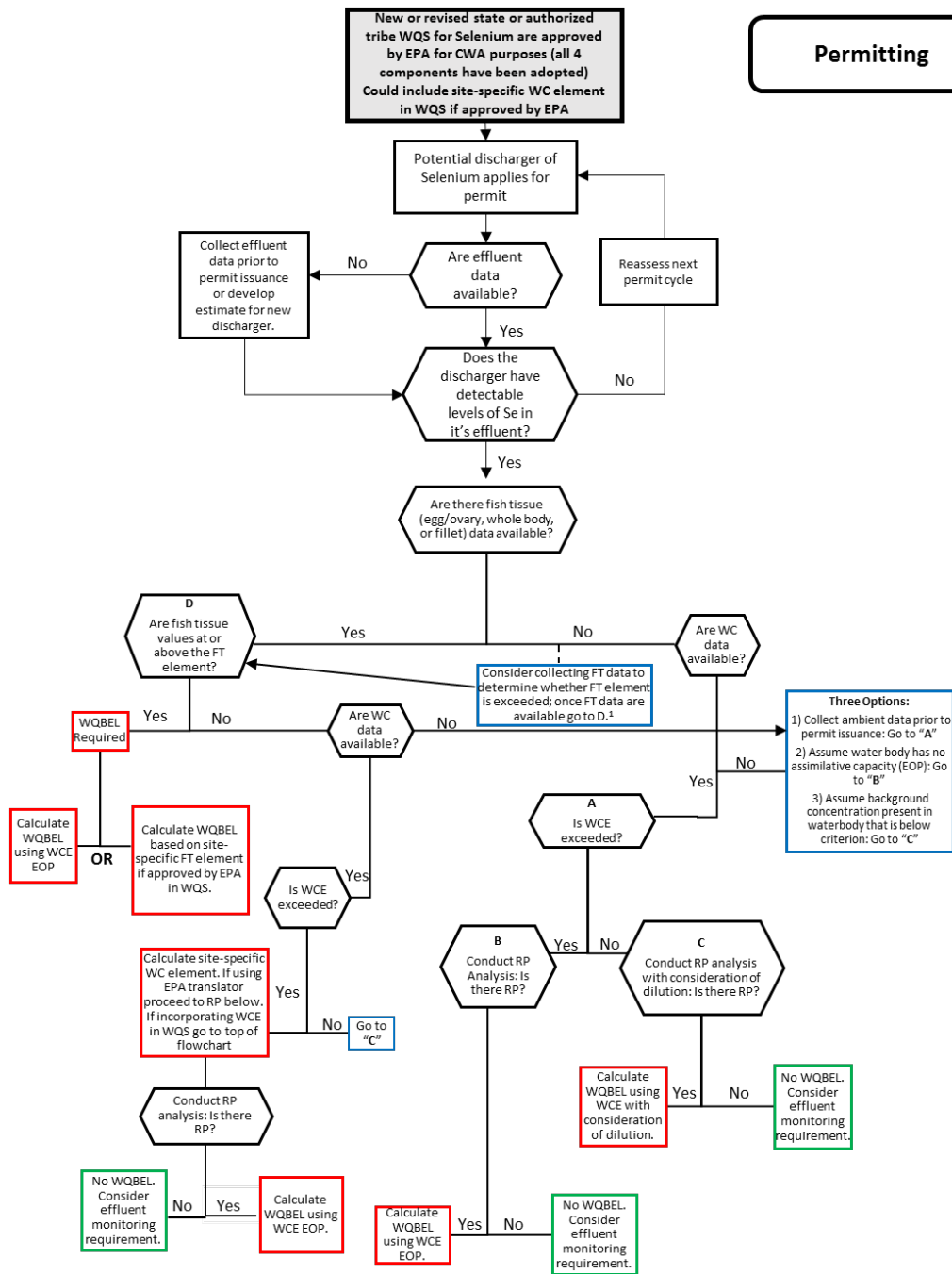
¹⁹ USEPA (U.S. Environmental Protection Agency). 2016. *Technical Support for Fish Tissue Monitoring for Implementation of EPA's 2016 Selenium Criterion*. U.S. Environmental Protection Agency, Office of Water, Office of Science and Technology, Washington, DC.

Attachment 1:
EPA's Aquatic Life Ambient Water Quality Criterion for
Selenium—Freshwater 2016

Media Type	Fish Tissue ¹		Water Column ⁴	
	Egg-ovary ²	Fish Whole-body or Muscle ³	Monthly Average Exposure	Intermittent Exposure ⁵
Magnitude	15.1 mg/kg dw	8.5 mg/kg dw whole-body or 11.3 mg/kg dw muscle (skinless, boneless filet)	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 ⁶	Instantaneous measurement ⁶	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.
3. Fish whole-body or muscle tissue supersedes water column element when both fish tissue and water concentrations are measured.
4. Water column values are based on dissolved total selenium in water and are derived from fish tissue values via bioaccumulation modeling. 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 ≥ 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.

Attachment 2: EPA's Recommended Flowchart for Implementing EPA's 2016 Selenium Criterion in NPDES Permits Program



¹ – RP analysis should not be delayed pending collection of fish tissue data.

- WCE: Water Column Element Concentration
- WC: Water Column Selenium Concentration
- RP: Reasonable Potential
- EOP: End of Pipe
- WQBEL: Water Quality Based Effluent Limit
- FT = Fish Tissue

- RP has been determined
- Transition box
- No RP

