The EPA Administrator, Gina McCarthy, signed the following proposed rule on March 31, 2016, and EPA is submitting it for publication in the *Federal Register* (FR). While we have taken steps to ensure the accuracy of this Internet version of the rule, it is not the official version of the rule for purposes of public comment. Please refer to the official version in a forthcoming FR publication, which will appear on the Government Printing Office's FDsys website (http://fdsys.gpo.gov/fdsys/search/home.action) and on Regulations.gov (http://www.regulations.gov) in Docket No. EPA-HQ-OW-2016-0012. Once the official version of this document is published in the FR, this version will be removed from the Internet and replaced with a link to the official version.

6560-50-P

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Part 131

[EPA-HQ-OW-2016-0012; FRL-9941-76-OW]

RIN 2040-AF60

Aquatic Life Criteria for Copper and Cadmium in Oregon

AGENCY: Environmental Protection Agency (EPA).

ACTION: Proposed rule.

SUMMARY: The Environmental Protection Agency (EPA) proposes to establish federal Clean Water Act (CWA) aquatic life criteria for freshwaters under the state of Oregon's jurisdiction, to protect aquatic life from the effects of exposure to harmful levels of copper and cadmium. Copper and cadmium naturally occur at low levels in surface waters but, at higher concentrations, can be toxic to aquatic life. Anthropogenic activities such as coal combustion, mining, electroplating, iron and steel production, and use of pigments, fertilizers and pesticides, can increase levels of cadmium in the environment. Sources of elevated copper in the

environment include mining, fabrication of paper, metal products and electronics, and discharges from wastewater treatment plants. In 2013, EPA determined that the freshwater cadmium criterion to limit acute adverse effects and the freshwater copper criteria to limit acute and chronic adverse effects that Oregon adopted in 2004 did not meet CWA requirements to protect aquatic life in the state. The CWA directs EPA to promptly propose water quality standards (WQS) that meet CWA requirements if a state does not adopt standards addressing EPA's disapproval. Oregon is currently engaging in its own rulemaking process to develop copper criteria that protect freshwater aquatic life, and has gone to great lengths to consider the input of EPA and other technical experts. However, the state has not yet adopted and submitted revised freshwater acute cadmium or acute and chronic copper criteria to EPA. Therefore, EPA proposes to establish federal freshwater acute cadmium and acute and chronic copper criteria that take into account the best available science, EPA policies, guidance and legal requirements, to protect aquatic life uses in Oregon. EPA will not proceed with final rulemaking (or will withdraw its final rule, as applicable) for freshwater acute cadmium and/or acute and chronic copper if Oregon adopts and submits protective criteria for cadmium and/or copper that EPA approves as meeting CWA requirements.

DATES: Comments must be received on or before *[insert date 45 days after publication in the* Federal Register*]***.**

ADDRESSES: Submit your comments, identified by Docket ID No. **EPA-HQ-OW-2016-0012**, at http://www.regulations.gov. Follow the online instructions for submitting comments. Once submitted, comments cannot be edited or removed from Regulations.gov. EPA may publish any

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comment received to its public docket. Do not submit electronically any information you consider to be Confidential Business Information (CBI) or other information whose disclosure is restricted by statute. Multimedia submissions (audio, video, etc.) must be accompanied by a written comment. The written comment is considered the official comment and should include discussion of all points you wish to make. EPA will generally not consider comments or comment contents located outside of the primary submission (i.e. on the web, cloud, or other file sharing system). For additional submission methods, the full EPA public comment policy, information about CBI or multimedia submissions, and general guidance on making effective comments, please visit http://www2.epa.gov/dockets/commenting-epa-dockets.

EPA is offering two virtual public hearings so that interested parties may also provide oral comments on this proposed rule. The first hearing will be on Monday, May 16, 2016 from 4:00pm to 6:00pm Pacific Time. The second hearing will be on Tuesday, May 17, 2016 from 9:00am to 11:00am Pacific Time. For more details on the public hearings and a link to register, please visit http://www.epa.gov/wqs-tech/water-quality-standards-regulations-oregon.

FOR FURTHER INFORMATION CONTACT: Erica Fleisig, Office of Water, Standards and Health Protection Division (4305T), Environmental Protection Agency, 1200 Pennsylvania Avenue, NW, Washington, DC 20460; telephone number: (202) 566-1057; email address: fleisig.erica@epa.gov.

SUPPLEMENTARY INFORMATION: This proposed rule is organized as follows:

I. General Information

Does This Action Apply to Me?

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II. Background

A. Statutory and Regulatory Authority

B. EPA's Disapproval of Oregon's Freshwater Copper and Cadmium Criteria

C. General Recommended Approach for Deriving Aquatic Life Criteria

III. Freshwater Cadmium Aquatic Life Criteria

A. EPA's National Recommended Cadmium Criteria

B. Proposed Acute Cadmium Criterion for Oregon's Freshwaters

C. Implementation of Proposed Freshwater Acute Cadmium Criterion in Oregon

IV. Freshwater Copper Aquatic Life Criteria

A. EPA's National Recommended Copper Criteria

B. Proposed Acute and Chronic Copper Criteria for Oregon's Freshwaters

C. Implementation of Proposed Freshwater Acute and Chronic Copper Criteria in Oregon

D. Ongoing State Efforts to Develop Copper Criteria for Oregon's Freshwaters

E. Incorporation by Reference

V. Critical Low-Flows and Mixing Zones

VI. Endangered Species Act

VII. Under What Conditions Will Federal Standards Be Not Promulgated or Withdrawn?

VIII. Alternative Regulatory Approaches and Implementation Mechanisms

A. Designating Uses

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B. Site-Specific Criteria

C. Variances

D. Compliance Schedules

IX. Economic Analysis

A. Identifying Affected Entities

B. Method for Estimating Costs

C. Results

X. Statutory and Executive Order Reviews

A. Executive Order 12866 (Regulatory Planning and Review) and Executive Order 13563 (Improving Regulation and Regulatory Review)

B. Paperwork Reduction Act

C. Regulatory Flexibility Act

D. Unfunded Mandates Reform Act

E. Executive Order 13132 (Federalism)

F. Executive Order 13175 (Consultation and Coordination with Indian Tribal Governments)

G. Executive Order 13045 (Protection of Children From Environmental Health and Safety Risks)

H. Executive Order 13211 (Actions That Significantly Affect Energy Supply, Distribution, or Use)

I. National Technology Transfer and Advancement Act of 1995

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J. Executive Order 12898 (Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations)

I. General Information

Does This Action Apply to Me?

Entities such as industries, stormwater management districts, or publicly owned treatment works (POTWs) that discharge pollutants to freshwaters of the United States under the state of Oregon's jurisdiction could be indirectly affected by this rulemaking, because federal WQS promulgated by EPA would be applicable to CWA regulatory programs, such as National Pollutant Discharge Elimination System (NPDES) permitting. Citizens concerned with water quality in Oregon could also be interested in this rulemaking. Categories and entities that could potentially be affected include the following:

Category	Examples of potentially affected entities
Industry	Industries discharging pollutants to freshwaters of the United States in Oregon.
Municipalities	Publicly owned treatment works or other facilities discharging pollutants to freshwaters of the United States in Oregon.
Stormwater Management Districts	Entities responsible for managing stormwater runoff in the state of Oregon.

This table is not intended to be exhaustive, but rather provides a guide for readers regarding entities that could be indirectly affected by this action. Any parties or entities who depend upon or contribute to the water quality of Oregon's waters could be affected by this proposed rule. To determine whether your facility or activities could be affected by this action, you should carefully examine this proposed rule. If you have questions regarding the applicability of this

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action to a particular entity, consult the person listed in the FOR FURTHER INFORMATION CONTACT section.

II. Background

A. Statutory and Regulatory Authority

CWA section 101(a)(2) establishes a national goal wherever attainable of “water quality which provides for the protection and propagation of fish, shellfish, and wildlife and provides for recreation in and on the water...” These are commonly referred to as the “fishable/swimmable” goals of the CWA.

CWA section 303(c) (33 U.S.C. 1313(c)) directs states to adopt WQS for their waters subject to the CWA. CWA section 303(c)(2)(A) and EPA's implementing regulations at 40 CFR part 131 require, among other things, that a state’s WQS specify designated uses of the waters, and water quality criteria that protect those uses. EPA’s regulations at 40 CFR 131.11(a)(1) provide that “[s]uch criteria must be based on sound scientific rationale and must contain sufficient parameters or constituents to protect the designated use.” In addition, 40 CFR 131.10(b) provides that "[i]n designating uses of a water body and the appropriate criteria for those uses, the [s]tate shall take into consideration the water quality standards of downstream waters and shall ensure that its water quality standards provide for the attainment and maintenance of the water quality standards of downstream waters.”

States are required to review applicable WQS at least once every three years and, if appropriate, revise or adopt new standards (CWA section 303(c)(1)). Any new or revised WQS must be submitted to EPA for review and approval or disapproval (CWA section 303(c)(2)(A)

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and (c)(3)). If EPA determines that a WQS that a state submits to EPA for review does not meet the requirements of the CWA, EPA must notify the state of the changes necessary to meet CWA requirements (CWA section 303(c)(3)). CWA section 303(c)(3) and (c)(4) further specify that if a state does not make those changes within 90 days of notification, EPA must promptly prepare and publish a revised or new WQS for the state. Under CWA section 303(c)(4)(B), the Administrator is authorized to determine, even in the absence of a state submission, that a new or revised standard is needed to meet CWA requirements.

Under CWA section 304(a), EPA periodically publishes criteria recommendations for states to consider when adopting water quality criteria for particular pollutants to meet the CWA section 101(a)(2) goals. In establishing numeric criteria, states should adopt water quality criteria based on EPA's CWA section 304(a) criteria, section 304(a) criteria modified to reflect site-specific conditions, or other scientifically defensible methods (40 CFR 131.11(b)(1)). Ultimately, whatever methods are used, criteria must protect the designated use and be based on sound scientific rationale (40 CFR 131.11(a)(1)).

B. EPA's Disapproval of Oregon's Freshwater Copper and Cadmium Criteria

On July 8, 2004, Oregon submitted 89 revised aquatic life criteria for 25 toxic pollutants to EPA for review under CWA 303(c). Many of Oregon's revised criteria were the same as EPA's nationally recommended 304(a) aquatic life criteria at the time. A subsequent consent decree between EPA and Northwest Environmental Advocates established deadlines for EPA to complete its CWA 303(c) review of Oregon's aquatic life criteria. Prior to taking a final action on the aquatic life criteria, EPA requested formal consultation with the National Marine Fisheries

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Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS) on its proposed approval of the criteria, consistent with section 7 of the Endangered Species Act (ESA). EPA initiated this consultation on January 14, 2008, by submitting a biological evaluation to the NMFS and USFWS, which contained an analysis of the potential effects of EPA's proposed approval of Oregon's criteria on threatened and endangered species in Oregon.[1]

On July 31, 2012, the USFWS provided its biological opinion to EPA. The biological opinion found that EPA's proposed approval of Oregon's aquatic life criteria would not jeopardize the continued existence of endangered species for which USFWS was responsible. However, on August 14, 2012, the NMFS concluded in its biological opinion that seven of Oregon's revised freshwater criteria would jeopardize the continued existence of endangered species in Oregon for which the NMFS was responsible. These seven criteria were the freshwater criteria Oregon adopted to protect aquatic life from adverse acute and chronic effects from ammonia, copper, and aluminum,[2] as well as the criterion to prevent adverse acute effects from cadmium. The NMFS biological opinion contained Reasonable and Prudent Alternatives (RPAs) for each of the four pollutants that would avoid the likelihood of jeopardy to the species. For

[1] EPA initiated consultation on Oregon's aluminum criteria based on its mistaken belief that Oregon's criteria were entirely equivalent to EPA's 1988 304(a) recommended criteria. However, Oregon's criteria specified that they applied "to waters with pH values less than 6.6 and hardness values less than 12 mg/L (as $CaCO_3$)" whereas EPA's 1988 304(a) recommended criteria "apply at pH values of 6.5–9.0." EPA ultimately disapproved Oregon's criteria because the state had not supplied a scientific rationale for the difference between Oregon's statement of the conditions under which the criteria would be valid and EPA's specified pH range for the criteria. Since EPA was disapproving the aluminum criteria, it sent a letter to the NMFS and USFWS identifying this change. The USFWS had already completed and transmitted its non-jeopardy opinion to EPA by that point, so it was too late for EPA to withdraw the consultation request for aluminum. However, in the letter to the NMFS, EPA withdrew its request for consultation on Oregon's acute and chronic aluminum criteria.

[2] The NMFS acknowledged EPA's request to withdraw the aluminum criteria from consultation; however, they did not have time to modify the biological opinion to exclude acute and chronic aluminum from the document.

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acute ammonia and cadmium, and acute and chronic aluminum, the RPA specified a process for deriving revised freshwater criteria. For the chronic ammonia criterion, the RPA specified that Oregon's previously applicable chronic ammonia criterion, which was based on EPA's 1985 304(a) recommendation, should remain in place. The NMFS RPA for acute and chronic copper criteria was to establish "a new acute criterion of 2.3 µg/L for freshwater copper using EPA's 2007 [Biotic Ligand Model (BLM)]-based aquatic life criteria" and "a new chronic criterion of 1.45 µg/L for freshwater copper using EPA's 2007 BLM-based aquatic life criteria." On January 19, 2016 the NMFS sent EPA a letter clarifying that "…use of EPA's 2007 copper BLM to derive copper criteria that are specific to individual locations or ecoregions is appropriate under the RPA, provided that the state of Oregon has the appropriate data to input into the BLM and appropriate procedures to use the BLM."

On January 31, 2013, EPA disapproved several of Oregon's revised aquatic life criteria under CWA 303(c), including the acute cadmium freshwater criterion, and the acute and chronic freshwater ammonia, copper, and aluminum criteria that the NMFS concluded would jeopardize endangered species in Oregon.[3] Oregon made changes to its freshwater ammonia criteria in response to EPA's 2013 disapproval and submitted revised freshwater ammonia criteria to EPA on January 23, 2015. EPA evaluated the revised freshwater ammonia criteria's consistency with the RPA for ammonia contained in the 2012 NMFS biological opinion, concluded that the revised criteria would protect endangered species in Oregon, and approved the revised criteria on

[3] The NMFS determined that the criterion Oregon adopted to protect aquatic life from adverse chronic effects from cadmium would not jeopardize the continued existence of endangered species; EPA approved Oregon's chronic cadmium criterion in January 2013.

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August 4, 2015. Although Oregon has been working closely with EPA to derive protective freshwater copper criteria that the state would adopt in a future rulemaking, the state has not yet addressed EPA's 2013 disapproval of its freshwater criteria for cadmium, copper, and aluminum. EPA is proposing the freshwater acute cadmium, and acute and chronic copper criteria in this rule in accordance with CWA section 303(c)(3) and (c)(4) requirements. EPA intends to propose freshwater acute and chronic criteria for aluminum in Oregon in a separate rulemaking at a later date following completion of updates to EPA's CWA section 304(a) recommended criteria for aluminum.

C. General Recommended Approach for Deriving Aquatic Life Criteria

Under the Agency's CWA section 304(a) authority, EPA develops methodologies and specific criteria to protect aquatic life and human health. These methodologies and criteria are subject to public as well as scientific expert review before EPA releases them as formal agency recommendations for states to consider when developing and adopting water quality criteria. To derive criteria for the protection of aquatic life, EPA follows its *Guidelines for Deriving Numerical National Water Quality Criteria for the Protection of Aquatic Organisms and Their Uses* (referred to as the "1985 Guidelines").[4] These guidelines describe an objective way to estimate the highest concentration of a substance in water that will not present a significant risk to the aquatic organisms in the water.

[4] USEPA. 1985. *Guidelines for Deriving Numerical National Water Quality Criteria for the Protection of Aquatic Organisms and Their Uses*. U.S. Environmental Protection Agency, Office of Research and Development, Duluth, MN, Narragansett, RI, Corvallis, OR. PB85-227049. http://www.epa.gov/sites/production/files/2015-08/documents/guidelines_for_deriving_nnwqc_for_the_protectin_of_aquatic_organisms_and_their_uses.pdf.

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Numeric criteria derived using EPA's 1985 Guidelines are expressed as short-term (acute) and long-term (chronic) values. The combination of a criteria maximum concentration (CMC), a one-hour average value, and a criteria continuous concentration (CCC), a four-day average value, protects aquatic life from acute and chronic toxicity, respectively.[5] Neither value is to be exceeded more than once in three years. EPA selected the CMC's one-hour averaging period because high concentrations of certain pollutants can cause death in one to three hours, and selected the CCC's four-day averaging period to prevent increased adverse effects on sensitive life stages. EPA based its once every three years exceedance frequency recommendation on the ability of aquatic ecosystems to recover from the exceedances (when the average concentration over the duration of the averaging period is above the CCC or the CMC).[6]

Since fresh and salt waters have different chemical compositions and different species assemblages, it is necessary to derive separate acute and chronic criteria for fresh and salt waters. Additionally, criteria may be based on certain water characteristics (e.g., pH, temperature, hardness, dissolved organic carbon (DOC), etc.), since water chemistry can influence a pollutant's bioavailability and toxicity. For metals in particular, EPA recommends expressing the

[5] In EPA's 2001 304(a) recommendation for cadmium and the 2007 304(a) recommendation for copper, EPA specified that the acute cadmium and copper criteria (CMCs) had 24-hour (rather than one-hour) durations. Subsequently, in the 2016 304(a) update for cadmium, EPA revised the cadmium CMC duration to one-hour to reflect the acute criteria duration recommended in the 1985 Guidelines. EPA proposes that the duration for both copper and cadmium CMCs in this rule be one-hour, to be consistent with the updated 304(a) recommendation for cadmium and with EPA's 1985 Guidelines. As articulated on page 35 of USEPA's 1991 *Technical Support Document for Water Quality-based Toxics Control*, March, 1991 (EPA/505/2-90-001), a one-hour averaging period is expected to be fully protective for the fastest-acting toxicants, and even more protective for slower-acting toxicants.

[6] *See* USEPA, 1985. Pages. 5-7.

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criteria as functions of chemical constituents of the water, since those constituents can form complexes with metals and render the metals biologically unavailable, or compete with metals for binding sites on aquatic organisms. Additionally, in 1995, EPA recommended that criteria for metals be expressed as dissolved (rather than total) metal concentrations, since the concentration of dissolved metal better approximates the toxic fraction.[7]

The 1985 Guidelines specify that it is necessary to have toxicity test data from a minimum of eight families of aquatic organisms to derive criteria. These families are intended to be representative of a wide spectrum of aquatic life, and act as surrogates for untested species. Therefore, the specific test organisms do not need to be present in the water(s) where the criteria will apply. However, states may develop site-specific criteria using species residing at the site if they maintain similar broad taxonomic representation. EPA derives acute criteria from 48- to 96-hour tests of lethality or immobilization. EPA derives chronic criteria from longer term (often longer than 28-day) tests that measure survival, growth, or reproduction. If sufficient chronic toxicity data are not available, chronic criteria are set by determining a ratio of acutely toxic to chronically toxic concentrations. Where appropriate, EPA recommends that criteria are lowered to protect commercially or recreationally important species.

For more detailed information on how EPA derives protective aquatic life criteria, see the 1985 Guidelines.[8]

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[7] *Water Quality Standards; Establishment of Numeric Criteria for Priority Toxic Pollutants; States' Compliance—Revision of Metals Criteria*, May 4, 1995, 60 FR 22229.
[8] *See* USEPA, 1985.

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III. Freshwater Cadmium Aquatic Life Criteria

A. EPA's National Recommended Cadmium Criteria

Water hardness (determined by the presence of calcium and magnesium ions, and expressed as calcium carbonate, $CaCO_3$) affects the toxicity of cadmium, as calcium and magnesium ions compete with cadmium for binding sites on aquatic organisms' gills. Organisms show more sensitivity to cadmium in lower hardness (soft) water than in hard water. EPA therefore expresses the national 304(a) recommended acute and chronic cadmium criteria as functions of water hardness.

EPA previously published final 304(a) recommended aquatic life criteria for cadmium in 2001.[9] In recent years, EPA embarked on an update to the science underlying the 2001 national cadmium criteria recommendations. This work included a literature search of toxicological databases, evaluation of those data, recalculation of the criteria based on those data updates, and revision of supporting documentation. In 2015, EPA completed an external peer review of the draft updated cadmium criteria and revised them accordingly. EPA then published the draft criteria for public comment in the *Federal Register*, and solicited comments for 60 days (December 1, 2015, 80 FR 75097). EPA revised the criteria to respond to the public comments,

[9] The 2001 304(a) national recommended freshwater cadmium criteria were the same criteria that Oregon adopted and submitted to EPA in 2004.
USEPA. 2001. *2001 Update of Ambient Water Quality Criteria for Cadmium*. U.S. Environmental Protection Agency, Office of Water, Washington, D.C. EPA-822-R-01-001. http://water.epa.gov/scitech/swguidance/standards/criteria/current/index.cfm#altable.

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and expects the final national updated 304(a) recommended cadmium criteria to be published in the *Federal Register* in April 2016.[10]

B. Proposed Acute Cadmium Criterion for Oregon's Freshwaters

To protect aquatic life in Oregon's freshwaters from acute toxic effects from cadmium, EPA proposes the one-hour average CMC not exceed $e^{(0.9789 \times \ln(\text{hardness})-3.866)} \times \text{CF}$ (µg/L, dissolved) more than once every three years. "CF" refers to the conversion factor and is used to convert the total recoverable concentration to a dissolved concentration, consistent with EPA's policy on criteria for metals. The equation for the acute cadmium CF is CF = 1.136672 – [(ln hardness) x (0.041838)]. This is the same freshwater acute cadmium criterion (and associated CF) as in EPA's final 2016 national updated 304(a) recommended cadmium criteria. The (ln hardness) term in both the CMC equation and the CF equation is the natural logarithm of the ambient water hardness in mg/L ($CaCO_3$).

Where site-specific hardness data are unavailable, EPA proposes to use a default hardness concentration of 25 mg/L (as $CaCO_3$), which equates to a one-hour average dissolved cadmium concentration of 0.49 µg/L.[11] As with other metals criteria in Oregon that are expressed as a function of hardness, the acute cadmium criterion equation requires ambient hardness data that represent the entire site to which the criterion will apply to calculate an acute cadmium criterion for a site. EPA strongly recommends that Oregon collect sufficiently representative

[10] See http://www.epa.gov/wqc/aquatic-life-criteria-cadmium.

[11] Oregon currently uses a default hardness concentration of 25 mg/L if no hardness data are available to calculate hardness-dependent metals criteria. See Oregon Department of Environmental Quality. 2014. *Methodology for Oregon's 2012 Water Quality Report and List of Water Quality Limited Waters (Pursuant to Clean Water Act Sections 303(d) and 305(b) and OAR 340-041-0046)*. Pages 76–77.

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ambient hardness data to determine the appropriate acute cadmium criterion for a site. However, EPA recognizes that, in certain situations, there will not be sufficiently representative ambient hardness data to adequately characterize the site; thus, EPA is proposing a default hardness concentration to provide clarity to NPDES permit writers and water body assessors on what acute cadmium criterion applies at the site. EPA evaluated the protectiveness of using a default hardness of 25 mg/L by calculating the 10th percentile of existing hardness concentrations in Oregon's waters, using U.S. Geological Survey (USGS) data on calcium and magnesium ion levels in waters within each of the nine Level III ecoregions in Oregon.[12] EPA selected the 10th percentile as a statistic that is both protective and can be reliably determined from small sample sizes. The USGS dataset that EPA evaluated indicates that the lowest 10th percentile ecoregional hardness in Oregon is 28 mg/L, suggesting that a default hardness concentration of 25 mg/L would be protective of the majority of Oregon's waters. However, certain water bodies in Oregon, such as relatively un-impacted headwaters, could have hardness concentrations below 25 mg/L, and Oregon should prioritize collecting ambient hardness data in those waters to ensure the resulting acute cadmium criteria are protective of aquatic life.

EPA's proposal to use a default hardness of 25 mg/L in the absence of sufficiently representative ambient hardness data should not be confused with use of a low-end hardness

[12] EPA used 10th percentile calcium and magnesium data from USEPA's *Draft Technical Support Document: Recommended Estimates for Missing Water Quality Parameters for Application in EPA's Biotic Ligand Model*, February 16, 2016 (EPA 820-R-15-106), along with the following equation to relate calcium and magnesium to hardness: mg/L $CaCO_3$ = 2.5*(calcium concentration in mg/L as Ca^{2+}) + 4.1*(magnesium concentration in mg/L as Mg^{2+}).
For a map of Level III ecoregions in the continental United States, see http://archive.epa.gov/wed/ecoregions/web/html/level_iii_iv-2.html#Level III.

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floor even when ambient data are available measuring hardness below 25 mg/L. Consistent with EPA guidance, a site's actual ambient water hardness should be used to calculate the criterion when sufficiently representative hardness data are available, even if the hardness is below 25 mg/L. [13]

In describing potential remedies to address EPA's January 2013 disapproval, EPA noted that "new scientific data on the toxicity of cadmium [are] now available and would need to be reviewed regarding their quality and relevance prior to being considered in developing an updated recommendation for a specific numeric criterion protective of Oregon aquatic life."[14] EPA's 2016 section 304(a) recommended cadmium criteria update represents a thorough review and incorporation of the latest scientific data on cadmium toxicity to aquatic life. The updated 304(a) recommended freshwater acute cadmium criterion, which EPA is proposing to apply in Oregon, now incorporates a more robust dataset on cadmium's acutely toxic effects, and was lowered to protect commercially and recreationally important salmonids, consistent with EPA's 1985 Guidelines. Additionally, EPA's proposal of a default hardness value as part of the criterion for Oregon will ensure that protective cadmium criteria can be easily derived for all freshwaters in the state. Therefore, EPA proposes that the 2016 section 304(a) recommended acute cadmium criterion, in combination with a protective hardness default that will apply in the absence of sufficiently representative ambient hardness data, will protect aquatic life in Oregon.

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[13] USEPA. 2002. *National Recommended Water Quality Criteria: 2002*. U.S. Environmental Protection Agency, Office of Water, Washington, D.C. EPA-822-R-02-047.

[14] USEPA. 2013. *EPA Clean Water Act 303(c) Determinations On Oregon's New and Revised Aquatic Life Toxic Criteria Submitted on July 8, 2004, and as Amended by Oregon's April 23, 2007 and July 21, 2011 Submissions*. Page 46.

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C. Implementation of Proposed Freshwater Acute Cadmium Criterion in Oregon

When calculating a hardness-based criterion value, Oregon should consider the following when defining a site to which the acute cadmium criterion applies: (1) metals are generally persistent, so calculating the criterion using hardness values from a small site at or near the discharge point could result in a criterion that is not protective of areas that are outside the defined site, and (2) as the size of a site increases, the spatial and temporal variability is likely to increase; thus, more water samples may be required to adequately characterize the entire site.[15] Additionally, pursuant to 40 CFR 131.10(b), Oregon must consider downstream WQS when calculating a protective criterion concentration in upstream waters.

When setting Water Quality-Based Effluent Limitations (WQBELs), Oregon should determine the water body's ambient hardness level under critical conditions (i.e., low hardness) when cadmium toxicity is expected to be higher, such that the resulting cadmium criterion is protective of the entire site at critical and less than critical conditions. EPA's NPDES Permit Writers' Manual describes the importance of determining effluent and receiving water critical conditions, because if a discharge is controlled so that it does not cause water quality criteria to be exceeded in the receiving water under critical conditions, then water quality criteria should be attained under all other conditions.[16] Because organisms are more sensitive to cadmium when corresponding hardness concentrations are low, Oregon should ensure that sufficiently

[15] USEPA. 1994. *Interim Guidance on Determination and Use of Water-Effect Ratios for Metals*. U.S. Environmental Protection Agency, Office of Water, Washington, D.C. EPA-823-B-94-001. February 1994.
[16] USEPA. 2010. *NPDES Permit Writers' Manual*. U.S. Environmental Protection Agency, Office of Water, Washington, D.C. EPA-833-K-10-001. September 2010.

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representative ambient hardness data are collected to have confidence that critical conditions in the water body are being adequately captured.

Substantial changes in a site's ambient hardness will likely affect the resulting acute cadmium criterion at that site. Therefore, EPA recommends that Oregon periodically revisit each water body's acute cadmium criterion and re-run the equation when changes in water hardness are evident or suspected at a site, and also as additional monitoring data become available.

IV. Freshwater Copper Aquatic Life Criteria

A. EPA's National Recommended Copper Criteria

In 2007, EPA issued revised section 304(a) national recommended freshwater aquatic life criteria for copper that represent the best available science and understanding of the interaction between water chemistry and copper toxicity.[17] These criteria recommendations incorporate use of a Biotic Ligand Model (BLM), which is a metal bioavailability model that uses receiving water body characteristics to develop water quality criteria on a site-specific basis. The BLM requires ambient data on ten water body-specific characteristics to calculate a freshwater copper criterion (temperature, pH, dissolved organic carbon (DOC), calcium, magnesium, sodium, potassium, sulfate, chloride, and alkalinity).

Along with the criteria recommendations, EPA released supplementary materials related to using the BLM on a site-specific basis to derive criteria. Training materials that EPA released

[17] USEPA. 2007. *Aquatic Life Ambient Freshwater Quality Criteria - Copper*. U.S. Environmental Protection Agency, Office of Water, Washington, D.C. EPA-822-R-07-001. http://water.epa.gov/scitech/swguidance/standards/criteria/aqlife/copper/upload/2009_04_27_criteria_copper_2007_criteria-full.pdf.

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in 2007 discussed considerations such as collecting sufficiently representative data to account for a site's spatial and temporal variability, properly defining the site to which the BLM-derived criterion applies, reconciling multiple model runs, and estimating input parameters when site-specific data are lacking.[18] To address situations where site-specific data are not available for some of the BLM's ten input variables, EPA published for public comment the *Draft Technical Support Document: Recommended Estimates for Missing Water Quality Parameters for Application in EPA's Biotic Ligand Model* (EPA 820-R-15-106) on February 16, 2016 (81 FR 7784).

B. Proposed Acute and Chronic Copper Criteria for Oregon's Freshwaters

To protect aquatic life in Oregon's freshwaters, EPA proposes the CMC and CCC based on the 2007 304(a) recommended copper BLM. EPA proposes to express the CMC as a one-hour average dissolved copper concentration (in µg/L) and the CCC as a four-day average dissolved copper concentration (in µg/L), and that the CMC and CCC are not to be exceeded more than once every three years.

As with hardness data used to determine the acute cadmium criterion discussed earlier, EPA recommends that Oregon collect ambient data to determine protective copper criteria by site. In the absence of sufficiently representative ambient data to run the BLM, EPA proposes default input values for DOC, calcium, magnesium, sodium, potassium, sulfate, chloride, and

[18] USEPA. 2007. *Copper Aquatic Life Criteria: Supplementary Training Materials*. U.S. Environmental Protection Agency, Office of Water, Washington, D.C. http://water.epa.gov/scitech/swguidance/standards/criteria/aqlife/copper/faq_index.cfm. See "Data Requirements."

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alkalinity that are based on the 10th percentile of existing concentrations of these variables in waters within each of Oregon's Level III ecoregions.[19] If information exists to characterize a water body's stream order (a measure of the relative size of a stream), EPA proposes to instead use the 10th percentile concentrations by stream order within each of Oregon's Level III ecoregions. These defaults (by ecoregion and by stream order within each ecoregion) are set forth in Tables 1 and 2 below and are described further in EPA's *Draft Technical Support Document: Recommended Estimates for Missing Water Quality Parameters for Application in EPA's Biotic Ligand Model* which can be found in the record for this rulemaking.[20] Because EPA is proposing default input parameters, protective copper criteria can be easily derived for assessment and permitting purposes (even in the absence of ambient data). EPA solicits comments on the Agency's proposal to use the 10th percentile of existing concentrations to derive default input parameters. EPA also solicits comments on using default input parameters based on a different percentile, such as the 5th or 25th (or another percentile within that range). Calculations of default input parameters at the 5th and 25th percentiles can also be found in the

[19] EPA is not proposing default input values for the other two BLM inputs, pH and temperature, because pH and temperature are highly variable and routinely monitored. EPA anticipates that sufficiently representative site-specific data will be available for these parameters. Even though EPA is proposing default values for DOC, EPA recommends that Oregon collect site-specific measurements of DOC if possible, because copper toxicity and BLM predictions are highly sensitive to DOC concentrations.

[20] *See* USEPA, 2016. EPA's proposed default inputs are from Tables 4, 8, 9, 10 and 20.

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record for this rulemaking (see *Fifth and Twenty-fifth Percentile Estimates for Copper BLM Input Parameters by Oregon Level III Ecoregion*).

Finally, EPA proposes that in order to calculate final acute and chronic copper criteria, Oregon use a value not to exceed the 10th percentile of individual BLM outputs for the site. While the 10th percentile should be protective in a majority of cases, certain circumstances may warrant use of a more stringent BLM output. When 10 or fewer data points are available for a given site, EPA proposes that Oregon use the lowest individual acute and chronic BLM outputs as the final acute and chronic criteria. EPA solicits comment on this approach, as well as alternative percentiles or approaches to reconciling individual copper BLM outputs into final acute and chronic copper criteria values.

EPA's proposed acute and chronic copper criteria for Oregon's freshwaters are as follows:

> Acute (CMC) and chronic (CCC) freshwater copper criteria shall be developed using EPA's 2007 *Aquatic Life Ambient Freshwater Quality Criteria – Copper* (EPA-822-R-07-001), which incorporates use of the copper biotic ligand model (BLM).
>
> Where sufficiently representative ambient data for DOC, calcium, magnesium, sodium, potassium, sulfate, chloride, or alkalinity are not available, the state shall use the 10th percentile estimated values from Table 1 based on the applicable ecoregion (or Table 2, based on the applicable ecoregion and stream order).
>
> The final copper criteria shall be calculated as no greater than the 10th percentile of the distribution of individual BLM outputs at a site. If 10 or fewer BLM outputs are available for a given site, the lowest individual acute and chronic BLM output values shall be used as the final acute and chronic copper criteria for that site.

Table 1. BLM Default Inputs for Each Level III Ecoregion in Oregon.

Level III Ecoregion	Calcium (mg/L)	Magnesium (mg/L)	Sodium (mg/L)	Potassium (mg/L)	Alkalinity (mg/L)	Chloride (mg/L)	Sulfate (mg/L)	DOC
1 Coast Range	8.4	3.2	4.1	0.64	33	3.2	4.8	0.7

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3 Willamette Valley	8.2	2.9	4.4	0.90	30	4.7	3.8	0.4
4 Cascades	6.6	2.9	3.5	0.74	35	2.2	3.2	0.3
9 Eastern Cascades Slopes and Foothills	8.2	3.8	6.0	1.0	44	3.2	5.0	0.5
10 Columbia Plateau	15	5.2	9.3	1.8	40	3.3	10	1.0
11 Blue Mountains	11	3.9	7.7	1.4	49	3.3	7.1	0.8
12 Snake River Plain	33	10	13	2.3	109	10	22	1.2
78 Klamath Mountains	8.7	4.6	4.0	0.66	44	2.1	3.5	0.6
80 Northern Basin and Range	26	8.2	20	2.7	89	15	24	1.0

Table 2. BLM Default Inputs for Each Stream Order within Each Level III Ecoregion in Oregon.

Level III Ecoregion	Stream Order	Calcium (mg/L)	Magnesium (mg/L)	Sodium (mg/L)	Potassium (mg/L)	Alkalinity (mg/L)	Chloride (mg/L)	Sulfate (mg/L)	DOC
1 Coast Range	SO 1-3	6.0	0.8	1.3	0.1	44	0.6	1.1	0.7
	SO 4-6	3.6	1.0	2.0	0.2	15	1.6	2.2	0.7
	SO 7-9	12	3.4	4.3	0.8	56	2.3	6.3	0.7
3 Willamette Valley	SO 1-3	9.9	3.8	5.6	1.5	-	2.3	1.5	0.4
	SO 4-6	7.1	2.5	4.3	0.8	29	4.6	2.8	0.4
	SO 7-9	5.0	1.6	3.4	0.6	20	2.7	2.3	0.4
4 Cascades	SO 1-3	1.0	0.2	1.8	0.2	-	0.5	0.2	0.3
	SO 4-6	3.5	1.0	2.8	0.4	16	0.8	0.8	0.3
	SO 7-9	13	3.6	3.7	0.9	52	1.7	6.9	0.3
9 Eastern Cascades Slopes and Foothills	SO 1-3	4.4	0.9	2.3	0.4	35	0.2	0.2	0.5
	SO 4-6	5.5	0.8	2.4	0.5	22	0.9	2.2	0.5
	SO 7-9	-	-	-	-	-	-	-	0.5
10 Columbia Plateau	SO 1-3	24.0	9.4	10.2	1.4	127	4.6	11	1.0
	SO 4-6	8.6	3.2	4.0	0.9	33	1.4	3.1	1.0
	SO 7-9	5.7	1.5	2.0	0.7	16	0.8	4.2	1.0
11 Blue Mountains	SO 1-3	8.6	3.2	-	-	169	-	-	0.8
	SO 4-6	3.7	0.8	1.6	0.7	16	0.3	0.7	0.8
	SO 7-9	8.5	1.5	3.3	0.7	32	0.8	5.0	0.8
12 Snake River Plain	SO 1-3	13	2.0	6.1	0.8	35	1.4	3.7	1.2
	SO 4-6	13	2.5	4.9	1.2	40	2.2	3.8	1.2
	SO 7-9	37	10	13	2.5	122	11	30	1.2
78 Klamath Mountains	SO 1-3	-	-	-	-	-	2.1	-	0.6
	SO 4-6	7.9	3.2	4.0	0.6	36	2.1	2.4	0.6

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	SO 7-9	-	-	-	-	-	-	-	0.6
80 Northern Basin and Range	SO 1-3	6.3	1.1	4.3	2.2	24	0.2	2.5	1.0
	SO 4-6	15	5.7	4.1	0.8	54	2.0	9.3	1.0
	SO 7-9	8.9	2.4	7.7	2.1	-	2.1	5.1	1.0

EPA's 2007 copper BLM represents the latest scientific knowledge on copper speciation and bioavailability. In describing potential remedies to address EPA's January 2013 disapproval, EPA noted that Oregon could use the 2007 copper BLM. The model provides predictable and repeatable outcomes, and EPA is proposing protective default inputs to use in the absence of site-specific data. EPA proposes that the combination of the 2007 copper BLM and default inputs will protect aquatic life in Oregon.

C. Implementation of Proposed Freshwater Acute and Chronic Copper Criteria in Oregon

EPA's proposed copper criteria for Oregon will be the first BLM-based criteria in Oregon and, therefore, the state does not have associated implementation methods. EPA strongly recommends that Oregon develop such methods, and give similar consideration to site selection, characterization of critical conditions, and data representativeness, as discussed for cadmium earlier in this proposed rule. Aquatic organisms are more sensitive to copper when corresponding DOC and pH levels in the water are low, so Oregon should ensure that sufficiently representative data are collected for the BLM's input parameters to have confidence that critical conditions are adequately characterized.

When Oregon derives copper criteria using the BLM, to promote transparency and ensure predictable and repeatable outcomes, EPA recommends that the state make each criterion and the

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geographic extent of the site to which the criterion applies publicly available on the state's website along with information such as:

1. The number of sampling events used to derive the criterion;
2. Whether the criterion relied on site-specific data, estimated data, or a combination of both; and
3. The date when the criterion was developed.

Finally, as discussed earlier with respect to ambient hardness levels, substantial changes in a site's water chemistry will likely affect any resulting copper criterion at that site. In addition, with regular monitoring and a robust, site-specific dataset, criteria can be developed that more accurately reflect site conditions and copper bioavailability than criteria set using default values or limited data sets. Therefore, EPA recommends that Oregon periodically revisit its copper criteria and re-run the BLM when changes in water chemistry are evident or suspected at a site, and also as additional monitoring data become available.

D. Ongoing State Efforts to Develop Copper Criteria for Oregon's Freshwaters

EPA's proposed methodology for deriving protective acute and chronic copper criteria described in the preceding paragraphs is not necessarily the only scientifically defensible and protective approach, and consistent with 40 CFR 131.11(b)(1)(iii), Oregon has the option to establish criteria based on other scientifically defensible methods. In 2015, the Oregon Department of Environmental Quality (DEQ) conducted an analysis of the copper BLM in preparation for adopting revised copper criteria to address EPA's 2013 disapproval. DEQ has spent significant time and resources collecting BLM input parameters at 138 locations across the

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state, as well as evaluating various methods to develop defaults that can be used in the absence of sufficiently representative ambient data. To date, DEQ has generally modeled its approach after the methodology presented in EPA's *Draft Technical Support Document: Recommended Estimates for Missing Water Quality Parameters for Application in EPA's Biotic Ligand Model* (EPA 820-R-15-106), but is considering different data sources and alternative geographic groupings of water bodies. EPA is working closely with DEQ, and will continue to provide input on the state's copper criteria development efforts.

E. Incorporation by Reference

EPA is proposing that the final EPA rule regulatory text will incorporate one EPA document by reference. In accordance with the requirements of 1 CFR 51.5, EPA is proposing to incorporate by reference EPA's 2007 *Aquatic Life Ambient Freshwater Quality Criteria – Copper* (EPA-822-R-07-001), discussed in section IV.A. of this preamble. EPA has made, and will continue to make, this document generally available electronically through www.regulations.gov and/or in hard copy at the appropriate EPA office (see the ADDRESSES section of this preamble for more information).

V. Critical Low-Flows and Mixing Zones

To ensure that the proposed criteria are applied appropriately to protect Oregon's aquatic life uses, EPA is proposing critical low-flow values for Oregon to use in calculating the available dilution for the purposes of determining the need for and establishing WQBELs in NPDES permits. Dilution is one of the primary mechanisms by which the concentrations of contaminants in effluent discharges are reduced following their introduction into a receiving water. Low flows

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can exacerbate the effects of effluent discharges because, during a low-flow event, there is less water available for dilution, resulting in higher instream pollutant concentrations. If criteria are implemented using inappropriate critical low-flow values (i.e., values that are too high), the resulting ambient concentrations could exceed criteria when low flows occur.[21]

EPA's March 1991 *Technical Support Document for Water Quality-based Toxics Control* recommends two methods for calculating acceptable critical low-flow values: the traditional hydrologically based method developed by the USGS and a biologically based method developed by EPA.[22] The hydrologically based critical low-flow value is determined statistically using probability and extreme values, while the biologically based critical low-flow is determined empirically using the specific duration and frequency associated with the criterion. For the acute cadmium and acute and chronic copper criteria, EPA proposes the following critical low-flow values:

Acute Aquatic Life (CMC): 1Q10 or 1B3

Chronic Aquatic Life (CCC): 7Q10 or 4B3

Using the hydrologically based method, the 1Q10 represents the lowest one-day average flow event expected to occur once every ten years, on average, and the 7Q10 represents the lowest seven-consecutive-day average flow event expected to occur once every ten years, on average.

[21] USEPA. 2014. *Water Quality Standards Handbook-Chapter 5: General Policies*. U.S. Environmental Protection Agency, Office of Water. Washington, D.C. EPA-820-B-14-004. http://www.epa.gov/sites/production/files/2014-09/documents/handbook-chapter5.pdf.

[22] USEPA. 1991. *Technical Support Document For Water Quality-based Toxics Control*. U.S. Environmental Protection Agency, Office of Water, Washington, D.C. EPA/505/2-90-001. http://www3.epa.gov/npdes/pubs/owm0264.pdf.

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Using the biologically based method, 1B3 represents the lowest one-day average flow event expected to occur once every three years, on average, and 4B3 represents the lowest four-consecutive-day average flow event expected to occur once every three years, on average.[23]

The criteria in this proposed rule, once finalized, would apply at the point of discharge unless Oregon authorizes a mixing zone. Where Oregon authorizes a mixing zone, the criteria would apply at the locations allowed by the mixing zone (i.e., the CCC would apply at the defined boundary of the chronic mixing zone and the CMC would apply at the defined boundary of the acute mixing zone).[24]

VI. Endangered Species Act

As noted earlier in this proposed rule, the NMFS 2012 biological opinion concluded that the acute cadmium and acute and chronic copper criteria that Oregon adopted in 2004 would jeopardize the continued existence of endangered species in Oregon. The opinion also contained RPAs for cadmium and copper that would avoid the likelihood of jeopardy to endangered species in Oregon. EPA will continue to work closely with the NMFS to ensure that the acute cadmium criterion that EPA ultimately finalizes is protective of federally listed species in Oregon. For copper, the NMFS further clarified in January 2016 that adoption of EPA's 2007 copper BLM, which EPA is proposing in this rule, would be consistent with the 2012 RPA.

VII. Under What Conditions Will Federal Standards Be Not Promulgated or Withdrawn?

[23] *See* USEPA, 2014.
[24] *See* USEPA, 1991.

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Under the CWA, Congress gave states primary responsibility for developing and adopting WQS for their waters (CWA section 303(a)–(c)). Although EPA is proposing cadmium and copper aquatic life criteria for Oregon's freshwaters to remedy EPA's 2013 disapproval, Oregon continues to have the option to adopt and submit to EPA acute cadmium and acute and chronic copper criteria for the state's freshwaters consistent with CWA section 303(c) and EPA's implementing regulations at 40 CFR part 131. EPA encourages Oregon to expeditiously adopt protective aquatic life criteria. Consistent with CWA section 303(c)(4), if Oregon adopts and submits cadmium and/or copper aquatic life criteria, and EPA approves such criteria before finalizing this proposed rule, EPA would not proceed with the promulgation for those waters and/or pollutants for which EPA approves Oregon's criteria.

If EPA finalizes this proposed rule, and Oregon subsequently adopts and submits cadmium and/or copper aquatic life criteria, EPA proposes that once EPA approves Oregon's WQS, the EPA-approved criteria in Oregon's WQS would become the applicable criteria for CWA purposes and EPA's promulgated criteria would no longer be applicable criteria. EPA would undertake a rulemaking to withdraw the federal criteria for cadmium and/or copper, but that process would not delay Oregon's approved criteria from becoming the sole applicable criteria for CWA purposes.

VIII. Alternative Regulatory Approaches and Implementation Mechanisms

Oregon will have considerable discretion to implement these aquatic life criteria, once finalized, through various water quality control programs. Among other things, EPA's regulations: (1) specify how states and authorized tribes establish, modify or remove designated

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uses, (2) specify the requirements for establishing criteria to protect designated uses, including criteria modified to reflect site-specific conditions, (3) authorize states and authorized tribes to adopt WQS variances to provide time to achieve the applicable WQS, and (4) allow states and authorized tribes to include compliance schedules in NPDES permits. Each of these approaches are discussed in more detail below.

A. Designating Uses

EPA's proposed cadmium and copper criteria apply to freshwaters in Oregon where the protection of fish and aquatic life is a designated use (see Oregon Administrative Rules at 340-041-8033, Table 30). The federal regulations at 40 CFR 131.10 provide information on establishing, modifying, and removing designated uses. If Oregon removes designated uses such that no fish or aquatic life uses apply to any particular water body affected by this rule and adopts the highest attainable use,[25] and EPA finds that removal to be consistent with CWA section 303(c) and the implementing regulations at 40 CFR part 131, then the federal cadmium and copper aquatic life criteria would no longer apply to that water body. Instead, any criteria associated with the newly designated highest attainable use would apply to that water body.

B. Site-Specific Criteria

The regulations at 40 CFR 131.11 specify requirements for modifying water quality criteria to reflect site-specific conditions. In the context of this rulemaking, a site-specific

[25] Highest attainable use is the modified aquatic life, wildlife, or recreation use that is both closest to the uses specified in section 101(a)(2) of the Act and attainable, based on the evaluation of the factor(s) in § 131.10(g) that preclude(s) attainment of the use and any other information or analyses that were used to evaluate attainability. There is no required highest attainable use where the state demonstrates the relevant use specified in section 101(a)(2) of the Act and sub-categories of such a use are not attainable (see 40 CFR 131.3(m)).

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criterion (SSC) is an alternative value to the federal freshwater cadmium or copper aquatic life criteria that would be applied on a watershed, area-wide, or water body-specific basis that meets the regulatory test of protecting the designated use, being scientifically defensible, and ensuring the protection and maintenance of downstream WQS. A SSC may be more or less stringent than the otherwise applicable federal criteria. A SSC may be appropriate when further scientific data and analyses can bring added precision to express the concentration of cadmium and/or copper that protects the aquatic life-related designated use in a particular water body.

C. Variances

40 CFR part 131 defines WQS variances at 131.3(o) as time-limited designated uses and supporting criteria for a specific pollutant(s) or water quality parameter(s) that reflect the highest attainable conditions during the term of the WQS variance. WQS variances adopted in accordance with 40 CFR part 131 allow states and authorized tribes to address water quality challenges in a transparent and predictable way. Variances help states and authorized tribes focus on making incremental progress in improving water quality, rather than pursuing a downgrade of the underlying water quality goals through a designated use change, when the current designated use is difficult to attain. Oregon has sufficient authority to use variances when implementing the criteria, as long as such variances are adopted consistent with 40 CFR 131.14. Oregon may use its currently EPA-approved variance procedures with respect to a temporary modification of its uses as it pertains to any federal criteria (see OAR 340-041-0059) when adopting such variances.

D. Compliance Schedules

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EPA's regulations at 40 CFR 122.47 and 40 CFR 131.15 allow states and authorized tribes to include permit compliance schedules in their NPDES permits if dischargers need additional time to meet their WQBELs based on the applicable WQS. EPA's updated regulations at 40 CFR part 131 also include provisions authorizing the use of permit compliance schedules to ensure that a decision to allow permit compliance schedules includes public engagement and transparency (80 FR 51022, August 21, 2015). Oregon already has an EPA-approved regulation authorizing the use of permit compliance schedules (see OAR 340-041-0061), consistent with 40 CFR 131.15. That state regulation is not affected by this rule, and Oregon is authorized to grant compliance schedules, as appropriate, based on the federal criteria.

IX. Economic Analysis

EPA's proposed cadmium and copper criteria may serve as a basis for development of NPDES permit limits. Oregon has NPDES permitting authority, and retains considerable discretion in implementing standards. EPA evaluated the potential costs to NPDES dischargers associated with state implementation of EPA's proposed criteria. This analysis is documented in *Economic Analysis for the Proposed Rule: Aquatic Life Criteria for Copper and Cadmium in Oregon*, which can be found in the record for this rulemaking.

Any NPDES-permitted facility that discharges cadmium or copper in Oregon could potentially incur compliance costs. The types of affected facilities could include industrial facilities and POTWs discharging treated wastewater to surface waters (i.e., point sources). EPA expects that dischargers would use similar process and treatment controls to come into compliance with the proposed cadmium and copper criteria as they would to comply with

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Oregon's existing aquatic life criteria for cadmium and copper (i.e., "baseline criteria"). EPA estimates the incremental impacts of the proposed rule against a baseline of full implementation of currently approved criteria.

For this analysis, EPA did not estimate the potential for costs to stormwater or nonpoint sources such as agricultural runoff. EPA recognizes that Oregon may require controls for nonpoint sources. However, it is difficult to model and evaluate the potential cost impacts of this rule to those sources because they are intermittent, variable, and occur under hydrologic or climatic conditions associated with precipitation events. Also, baseline total maximum daily loads (TMDLs) for waters with baseline impairment for cadmium or copper have not yet been developed. Therefore, determining which waters would not achieve standards based on the proposed aquatic life criteria after complying with existing (baseline) regulations and policies may not be possible.

A. Identifying Affected Entities

For economic analysis purposes, EPA developed hypothetical applications of the proposed cadmium and copper criteria using conservative estimates for hardness and the BLM inputs, respectively. The criteria that EPA derived for the cost analysis would likely be different from and possibly lower (more stringent) than the actual criteria applications that Oregon would derive using ambient data from each water body. As described earlier in this proposed rule, EPA recommends that Oregon collect sufficiently representative ambient data to derive the most accurate and protective cadmium and copper aquatic life criteria.

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Using the criteria derived for the cost analysis, EPA identified 10 point source facilities that could potentially be affected by the rule – all are major dischargers. Major facilities are typically those that discharge more than 1 million gallons per day (mgd). Of these potentially affected facilities, 7 are POTWs and 3 are industrial dischargers. EPA did not include facilities covered by general permits in its analysis because data for such facilities are limited, and flows are usually much lower. EPA did not have cadmium or copper effluent data to evaluate minor facilities for this preliminary analysis.

B. Method for Estimating Costs

EPA estimated costs for the 10 potentially affected facilities. EPA evaluated existing baseline permit conditions, reasonable potential to exceed estimates of the aquatic life criteria based on the proposed rule, and potential to exceed projected effluent limitations based on available effluent monitoring data. In instances of exceedances of projected effluent limitations under the proposed criteria, EPA determined the likely compliance scenarios and costs. Only compliance actions and costs that would be needed above the baseline level of controls are attributable to the proposed rule.

EPA assumed that dischargers would pursue the least cost means of compliance with WQBELs. Incremental compliance actions attributable to the proposed rule may include pollution prevention, end-of-pipe treatment, and alternative compliance mechanisms (e.g., variances). EPA annualized capital costs over an assumed technology lifespan of 20 years, adding recurring Operation & Maintenance costs, and discounted using 3% and 7% discount rates to obtain total annual costs per facility.

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C. Results

Based on the results for 10 facilities, EPA estimated a total incremental annual cost attributable to the proposed criteria of approximately $0.1 million to $18.2 million at a 3% discount rate.[26] The low end of the range reflects the assumption that achieving very low copper limits is infeasible (e.g., available treatment technologies cannot consistently achieve the limits) and dischargers will need to apply for variances. The high end of the range reflects the assumption that dischargers can achieve the projected effluent limits through end-of-pipe treatment. All of the incremental costs are attributable to municipal and industrial dischargers for treatment of copper. There was no reasonable potential to exceed the proposed acute cadmium criterion.

If the revised criteria result in an incremental increase in impaired waters, resulting in the need for TMDL development, there could also be some costs to nonpoint sources of metals. Using available ambient monitoring data, EPA compared cadmium and copper concentrations to the baseline and proposed criteria, identifying waterbodies that may be incrementally impaired (i.e., impaired under the proposed criteria but not under the baseline). Baseline impairment ranged from 8 to 46 stations, depending on whether EPA used impaired water body information from 2010 or 2012. Using available monitoring data, EPA identified copper impairments at 82 monitoring stations based on the proposed criteria. Therefore, water quality data indicate potential for incremental impairment at 36 to 74 stations. This increase suggests that nonpoint sources may bear some compliance costs, although data are not available to estimate the

[26] The estimated costs using a 7% discount rate range from $0.1 million to $22.6 million.

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magnitude of these costs. If the net increase in stations (36 to 74) is an indication of the potential increase in the number of TMDLs, then the costs for TMDL development could range from approximately $1.3 million (36 TMDLs x $37,000) to $3.0 million (74 TMDLs x $40,000)[27]. The control of nonpoint sources such as in the context of a TMDL could result in less stringent requirements, and thus lower costs, for point sources.

X. Statutory and Executive Order Reviews

A. Executive Order 12866 (Regulatory Planning and Review) and Executive Order 13563 (Improving Regulation and Regulatory Review)

This action is not a significant regulatory action and was therefore not submitted to the Office of Management and Budget (OMB) for review. The proposed rule does not establish any requirements directly applicable to regulated entities or other sources of toxic pollutants. However, these WQS may serve as a basis for development of NPDES permit limits. Oregon has NPDES permitting authority, and retains considerable discretion in implementing standards. In the spirit of Executive Order 12866, EPA evaluated the potential costs to NPDES dischargers associated with state implementation of EPA's proposed criteria. This analysis, *Economic Analysis for the Proposed Rule: Aquatic Life Criteria for Copper and Cadmium in Oregon*, is summarized in section IX of the preamble and is available in the docket.

[27] U.S. EPA (2001) reports that the average cost to develop a TMDL for a single source of impairment ranges from $27,000 to $29,000 (in 2000 dollars), which becomes $37,000 to $40,000 using the Consumer Price Index to escalate to 2015 dollars.

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B. Paperwork Reduction Act

This action does not impose an information collection burden under the PRA. While actions to implement these WQS could entail additional paperwork burden, this action does not directly contain any information collection, reporting, or record-keeping requirements.

C. Regulatory Flexibility Act

I certify that this action will not have a significant economic impact on a substantial number of small entities under the RFA. This action will not impose any requirements on small entities. Small entities, such as small businesses or small governmental jurisdictions, are not directly regulated by this rule.

D. Unfunded Mandates Reform Act

This action does not contain any unfunded mandate as described in UMRA, 2 U.S.C. 1531-1538, and does not significantly or uniquely affect small governments. As these water quality criteria are not self-implementing, the action imposes no enforceable duty on any state, local or tribal governments or the private sector.

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E. Executive Order 13132 (Federalism)

This action does not have federalism implications. It will not have substantial direct effects on the states, on the relationship between the national government and the states, or on the distribution of power and responsibilities among the various levels of government. This rule does not alter Oregon's considerable discretion in implementing these WQS, nor would it preclude Oregon from adopting WQS that meet the requirements of the CWA, either before or after promulgation of the final rule, which would eliminate the need for federal standards upon EPA approval. Thus, Executive Order 13132 does not apply to this action.

In the spirit of Executive Order 13132 and consistent with EPA policy to promote communications between EPA and state and local governments, EPA specifically solicits comments on this proposed action from state and local officials.

F. Executive Order 13175 (Consultation and Coordination with Indian Tribal Governments)

This action does not have tribal implications as specified in Executive Order 13175. This proposed rule does not impose substantial direct compliance costs on federally recognized tribal governments, nor does it substantially affect the relationship between the federal government and tribes, or the distribution of power and responsibilities between the federal government and tribes. Thus, Executive Order 13175 does not apply to this action.

Many tribes in the Pacific Northwest hold reserved rights to take fish for subsistence, ceremonial, religious, and commercial purposes. EPA developed the criteria in this proposed rule to protect aquatic life in Oregon from the effects of exposure to harmful levels of cadmium and copper. Protecting the health of fish in Oregon will, therefore, support tribal reserved fishing

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rights, including treaty-reserved rights, where such rights apply in waters under state jurisdiction.

Consistent with the EPA Policy on Consultation and Coordination with Indian Tribes, EPA consulted with tribal officials during the development of this action. On November 23, 2015, EPA sent a letter to tribal leaders in Oregon offering to consult on the proposed cadmium and copper criteria in this rule. On December 15, 2015, EPA held a conference call with tribal water quality technical contacts to explain EPA's proposed action and timeline. Formal consultation on the proposed action was not requested by any of the tribes. EPA will continue to communicate with the tribes prior to its final action.

G. Executive Order 13045 (Protection of Children from Environmental Health and Safety Risks)

EPA interprets Executive Order 13045 as applying only to those regulatory actions that concern environmental health or safety risks that EPA has reason to believe may disproportionately affect children, per the definition of "covered regulatory action" in section 2-202 of the Executive Order. This action is not subject to Executive Order 13045 because it does not concern an environmental health risk or safety risk.

H. Executive Order 13211 (Actions that Significantly Affect Energy Supply, Distribution, or Use)

This action is not subject to Executive Order 13211, because it is not a significant regulatory action under Executive Order 12866.

I. National Technology Transfer and Advancement Act of 1995

This proposed rulemaking does not involve technical standards.

J. Executive Order 12898 (Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations)

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The human health or environmental risk addressed by this action will not have potential disproportionately high and adverse human health or environmental effects on minority, low-income or indigenous populations. The criteria in this proposed rule will support the health and abundance of aquatic life in Oregon, and will therefore benefit all communities that rely on Oregon's ecosystems.

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List of Subjects in 40 CFR Part 131

Environmental protection, Indians-lands, Incorporation by reference, Intergovernmental relations, Reporting and recordkeeping requirements, Water pollution control.

Dated:

_____

Gina McCarthy,

Administrator.

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For the reasons set forth in the preamble, EPA proposes to amend 40 CFR part 131 as follows:

PART 131—WATER QUALITY STANDARDS

1. The authority citation for part 131 continues to read as follows:

Authority: 33 U.S.C. 1251 *et seq.*

Subpart D—Federally Promulgated Water Quality Standards

2. Add §131.46 to read as follows:

§131.46 Aquatic Life Criteria for Copper and Cadmium in Oregon.

(a) *Scope*. This section promulgates aquatic life criteria for cadmium and copper in freshwaters in Oregon.

(b) *Criteria for cadmium and copper in Oregon*. The aquatic life criteria in Table 1 apply to all freshwaters in Oregon where fish and aquatic life are a designated use.

Table 1. Proposed Cadmium and Copper Aquatic Life Criteria for Oregon Freshwaters			
Metal	**CAS Number**	**Criterion Maximum Concentration (CMC)[3] (µg/L)**	**Criterion Continuous Concentration (CCC)[4] (µg/L)**
Cadmium[1,2]	7440439	$[e^{(0.9789 \times \ln(\text{hardness})-3.866)}] \times CF$ Where CF = 1.136672 – [(ln hardness) x (0.041838)]	--
Copper[1]	7440508	Acute (CMC) and chronic (CCC) freshwater copper criteria shall be developed using EPA's 2007 *Aquatic Life Ambient Freshwater Quality Criteria—Copper* (EPA-822-R-07-001), which incorporates use of the copper biotic ligand model (BLM). Where sufficiently representative ambient data for DOC, calcium, magnesium, sodium, potassium, sulfate, chloride, or alkalinity are not available, the state shall use the 10th percentile estimated values from Table 2 of paragraph (c) of this section based on the applicable ecoregion (or Table 3 of paragraph (c) of this section, based on the applicable ecoregion and stream order).	

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		The final copper criteria shall be calculated as no greater than the 10th percentile of the distribution of individual BLM outputs at a site. If 10 or fewer BLM outputs are available for a given site, the lowest individual acute and chronic BLM output values shall be used as the final acute and chronic copper criteria for that site.

[1] The criteria for cadmium and copper are expressed as dissolved metal concentrations.
[2]CF is the conversion factor used to convert between the total recoverable and dissolved forms of cadmium. The term (ln hardness) in the CMC and the CF equation is the natural logarithm of the ambient hardness in mg/L ($CaCO_3$). A default hardness concentration of 25 mg/L shall be used to calculate cadmium criteria in the absence of sufficiently representative ambient hardness data. A hardness concentration of 25 mg/L equates to a one-hour average dissolved cadmium concentration of 0.49 µg/L.
[3]The CMC is the highest allowable one-hour average instream concentration of cadmium or copper. The CMC is not to be exceeded more than once every three years. The CMC is rounded to two significant figures.
[4] The CCC is the highest allowable four-day average instream concentration of copper. The CCC is not to be exceeded more than once every three years. The CCC is rounded to two significant figures.

(c) *Estimated Values to Derive Copper Criteria*. The default inputs to calculate copper criteria using the BLM in the absence of sufficiently representative ambient data are shown in Tables 2 and 3.

Table 2. BLM Default Inputs for Each Level III Ecoregion in Oregon

Level III Ecoregion	Calcium (mg/L)	Magnesium (mg/L)	Sodium (mg/L)	Potassium (mg/L)	Alkalinity (mg/L)	Chloride (mg/L)	Sulfate (mg/L)	DOC
1 Coast Range	8.4	3.2	4.1	0.64	33	3.2	4.8	0.7
3 Willamette Valley	8.2	2.9	4.4	0.90	30	4.7	3.8	0.4
4 Cascades	6.6	2.9	3.5	0.74	35	2.2	3.2	0.3
9 Eastern Cascades Slopes and Foothills	8.2	3.8	6.0	1.0	44	3.2	5.0	0.5
10 Columbia Plateau	15	5.2	9.3	1.8	40	3.3	10	1.0
11 Blue Mountains	11	3.9	7.7	1.4	49	3.3	7.1	0.8
12 Snake River Plain	33	10	13	2.3	109	10	22	1.2
78 Klamath Mountains	8.7	4.6	4.0	0.66	44	2.1	3.5	0.6
80 Northern Basin and Range	26	8.2	20	2.7	89	15	24	1.0

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Table 3. BLM Default Inputs for Each Stream Order within Each Level III Ecoregion in Oregon

Level III Ecoregion	Stream Order	Calcium (mg/L)	Magnesium (mg/L)	Sodium (mg/L)	Potassium (mg/L)	Alkalinity (mg/L)	Chloride (mg/L)	Sulfate (mg/L)	DOC
1 Coast Range	SO 1-3	6.0	0.8	1.3	0.1	44	0.6	1.1	0.7
	SO 4-6	3.6	1.0	2.0	0.2	15	1.6	2.2	0.7
	SO 7-9	12	3.4	4.3	0.8	56	2.3	6.3	0.7
3 Willamette Valley	SO 1-3	9.9	3.8	5.6	1.5	-	2.3	1.5	0.4
	SO 4-6	7.1	2.5	4.3	0.8	29	4.6	2.8	0.4
	SO 7-9	5.0	1.6	3.4	0.6	20	2.7	2.3	0.4
4 Cascades	SO 1-3	1.0	0.2	1.8	0.2	-	0.5	0.2	0.3
	SO 4-6	3.5	1.0	2.8	0.4	16	0.8	0.8	0.3
	SO 7-9	13	3.6	3.7	0.9	52	1.7	6.9	0.3
9 Eastern Cascades Slopes and Foothills	SO 1-3	4.4	0.9	2.3	0.4	35	0.2	0.2	0.5
	SO 4-6	5.5	0.8	2.4	0.5	22	0.9	2.2	0.5
	SO 7-9	-	-	-	-	-	-	-	0.5
10 Columbia Plateau	SO 1-3	24.0	9.4	10.2	1.4	127	4.6	11	1.0
	SO 4-6	8.6	3.2	4.0	0.9	33	1.4	3.1	1.0
	SO 7-9	5.7	1.5	2.0	0.7	16	0.8	4.2	1.0
11 Blue Mountains	SO 1-3	8.6	3.2	-	-	169	-	-	0.8
	SO 4-6	3.7	0.8	1.6	0.7	16	0.3	0.7	0.8
	SO 7-9	8.5	1.5	3.3	0.7	32	0.8	5.0	0.8
12 Snake River Plain	SO 1-3	13	2.0	6.1	0.8	35	1.4	3.7	1.2
	SO 4-6	13	2.5	4.9	1.2	40	2.2	3.8	1.2
	SO 7-9	37	10	13	2.5	122	11	30	1.2
78 Klamath Mountains	SO 1-3	-	-	-	-	-	2.1	-	0.6
	SO 4-6	7.9	3.2	4.0	0.6	36	2.1	2.4	0.6
	SO 7-9	-	-	-	-	-	-	-	0.6
80 Northern Basin and Range	SO 1-3	6.3	1.1	4.3	2.2	24	0.2	2.5	1.0
	SO 4-6	15	5.7	4.1	0.8	54	2.0	9.3	1.0
	SO 7-9	8.9	2.4	7.7	2.1	-	2.1	5.1	1.0

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(d) *Applicability*. (1) The criteria in paragraph (b) of this section are the applicable acute cadmium and acute and chronic copper aquatic life criteria in all freshwaters in Oregon where fish and aquatic life are a designated use. After the effective date of this rule, in cases where EPA determines that state cadmium or copper aquatic life criteria meet the requirements of Clean Water Act section 303(c) and 40 CFR part 131, Oregon's cadmium or copper criteria will apply rather than the criteria in paragraph (b) of this section.

(2) The criteria established in this section are subject to Oregon's general rules of applicability in the same way and to the same extent as are other federally promulgated and state-adopted numeric criteria when applied to freshwaters in Oregon where fish and aquatic life are a designated use.

(i) For all waters with mixing zone regulations or implementation procedures, the criteria apply at the appropriate locations within or at the boundary of the mixing zones; otherwise the criteria apply throughout the water body including at the end of any discharge pipe, conveyance or other discharge point.

(ii) The state shall not use a low flow value that is less stringent than the values listed below for waters suitable for the establishment of low flow return frequencies (i.e., streams and rivers) when calculating the available dilution for the purposes of determining the need for and establishing Water Quality-Based Effluent Limitations in National Pollutant Discharge Elimination System permits:

Acute criteria (CMC)	1Q10 or 1B3
Chronic criteria (CCC)	7Q10 or 4B3

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Where:

1. 1Q10 is the lowest one-day average flow event expected to occur once every ten years, on average (determined hydrologically).
2. 1B3 is the lowest one-day average flow event expected to occur once every three years, on average (determined biologically).
3. 7Q10 is the lowest seven-consecutive-day average flow event expected to occur once every ten years, on average (determined hydrologically).
4. 4B3 is the lowest four-consecutive-day average flow event expected to occur once every three years, on average (determined biologically).

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