U.S. ENVIRONMENTAL PROTECTION AGENCY – REGION 10

Technical Support Document

for Action on the State of Oregon's New and Revised Human Health Water Quality Criteria for Toxics and Associated Implementation Provisions Submitted July 12 and 21, 2011

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TECHNICAL SUPPORT DOCUMENT
For Action on the State of Oregon's New and Revised Human Health Water Quality Criteria for Toxics and Associated Implementation Provisions Submitted July 12 and 21, 2011

I. INTRODUCTION

In consideration of current information relative to fish consumption in Oregon, the Oregon Department of Environmental Quality (ODEQ) proposed revisions to Oregon's water quality standards (WQS) located in Chapter 340, Division 41 of Oregon's Administrative Rules (OAR 340-041). ODEQ proposed new and revised human health water quality criteria for toxics and associated implementation provisions on December 21, 2010. ODEQ provided a formal public comment period on the proposed revisions and held nine public hearings. The public comment period extended from December 21, 2010 through March 21, 2011. 1,075 written comments were received and responded to by ODEQ. Revisions were adopted by the Oregon Environmental Quality Commission (EQC or Commission) on June 16, 2011, and filed with Oregon Secretary of State on July 13, 2011. Oregon's submittal included a letter dated July 20, 2011, from Larry Knudsen, Assistant Attorney General, certifying that the revisions were adopted in accordance with Oregon State law. In accordance with Section 303(c) of the Clean Water Act (CWA) ODEQ submitted these revisions to EPA for review and approval on July 21, 2011.

ODEQ revised their human health criteria for iron and manganese in a separate submittal dated January 18, 2011, which EPA approved on June 9, 2011. ODEQ also revised the human health criteria for arsenic in a separate submittal dated July 12, 2011, which EPA is now approving as part of this action. ODEQ accepted public comments on these revisions from August 25 to September 30, 2010, and held public hearings in Portland and Pendleton. ODEQ also conducted further public comment on the proposed rule, including revised proposed numeric criteria from February 1 to February 23, 2011. These revisions were adopted by the EQC on April 21, 2011 and became effective under State law upon filing with the Oregon Secretary of State on June 30, 2011. ODEQ submitted the revisions to the human health criteria for arsenic to EPA for review and approval on July 12, 2011. Oregon's submittal included a letter dated July 11, 2011, from Larry Knudsen, Assistant Attorney General, certifying that the revisions were adopted in accordance with Oregon State law.

The June 16, 2011 rule package adopted by the EQC included revisions to the States' Total Maximum Daily Load (TMDL) and National Pollutant Discharge Elimination System (NPDES) permitting regulations found in OAR 340-042 and 045. These are revisions to Oregon's implementation rules and are not water quality standards. Accordingly, Oregon did not include

them in the materials submitted for review under Section 303(c) of the CWA and EPA does not address them in today's action.

Revisions addressed in today's decision can be divided into the general categories described below.

1. ***New and revised human health criteria for carcinogens and non-carcinogens at OAR 340-041-0033.***
   ODEQ adopted new and revised human health criteria for 104 toxic pollutants (48 non-carcinogens and 56 carcinogens) based on a fish consumption rate of 175 grams per day. The criteria for these toxic pollutants are consistent with EPA's 304(a) recommended criteria values[1] and were derived using the methodology presented in EPA's 2000 *Methodology for Deriving Ambient Water Quality Criteria for the Protection of Human Health*[2] and EPA's 2001 Methylmercury guidance.[3] The new and revised human health criteria for toxic pollutants are contained in Table 40.

   Additional revisions related to the human health criteria include:

   - The removal of 13 pollutants consistent with EPA's removal of 304(a) recommended criteria values for these same pollutants. Most of these recommended criteria were withdrawn since EPA developed individual criteria for the most toxic of chemicals in the family of chemicals represented by those 13 pollutants.
   - Several new, revised and withdrawn footnotes to the criteria in order to provide clarification.
   - Revisions to the water quality standards provision at OAR 340-041-0033 which revise regulatory citations and table numbers referencing the human health and aquatic life criteria tables.

2. ***Revised arsenic human health criteria.***
   ODEQ adopted revised human health criteria for arsenic and submitted the revised criteria separately to EPA on July 12, 2011.

3. ***New implementation provision entitled "Site-specific background pollutant criteria" at OAR 340-041-0033(6).***
   ODEQ adopted a new provision that allows it to develop a site-specific criteria for a portion of a waterbody in the vicinity of an NPDES permitted discharge in limited instances. The criteria is only applicable for criteria addressing carcinogenic effects on

[1] EPA. 2009. *EPA National Recommended Water Quality Criteria.* U.S. Environmental Protection Agency Office of Water. Office of Science and Technology. Available at: http://water.epa.gov/scitech/swguidance/standards/current/upload/nrwqc-2009.pdf
[2] EPA. 2000. *Methodology for Deriving Ambient Water Quality Criteria for the Protection of Human Health*. U.S. Environmental Protection Agency, Office of Water, EPA-822-B-00-004. Available at: http://www.epa.gov/waterscience/criteria/humanhealth/method/complete.pdf
[3] EPA. 2001. *Water Quality Criterion for the Protection of Human Health: Methylmercury*. U.S. Environmental Protection Agency, Office of Water, Washington, D.C. EPA 823-R-01-001. Available at: http://www.epa.gov/waterscience/criteria/methylmercury/document.html

human health and for pollutants that are taken into a facility through their intake water and discharged to the same waterbody at an equal or lower mass. The instream criterion concentration is limited to three percent above the ambient condition and may not exceed a 10^{-4} risk level as calculated using the same input variables as used to calculate the criteria in Table 40.

4. ***Revised variance provision at OAR 340-041-0059.***
   ODEQ has removed the variance authorizing procedure found at OAR 340-041-0061(2) and replaced it with a new procedure at OAR 340-041-0059. ODEQ's objective for these revisions was to ensure that variances and their accompanying pollutant reduction plans continue to ensure progress toward meeting standards, to streamline the administration process, and to require pollutant reduction plans with specific milestones that will result in water quality improvement, and add general clarification to the rule. All variances adopted under this provision require EPA approval.

5. ***A correction to a cross-reference in the bacteria provision found at OAR 340-041-0009(10).***
   ODEQ adopted a revision to correct the cross-reference in this provision to reflect rule numbering revisions in OAR 340-041-0061.

6. ***Revised rules explaining how the mechanisms for forestry and agricultural nonpoint sources work to meet water quality standards and the total maximum daily load (TMDL) load at OAR 340-041-0007(5) and OAR 340-041-0061(9)(a)(E), (10), and (11).***
   ODEQ adopted revisions to clarify how nonpoint sources will be addressed in TMDLs and how ODEQ will interact with the Departments of Forestry and Agriculture to ensure needed programs are in place to address these sources of pollution.

II. ORGANIZATION OF DOCUMENT

This document is organized in the following manner. Part III of this document contains background on ODEQ's process to adopt new and revised human health criteria and information regarding the July 12 and 21, 2011 submittals.

Part IV contains the basis for EPA's decisions under section 303(c) of the Clean Water Act (CWA) and implementing regulations found in the Code of Federal Regulations (CFR) at 40 CFR § 131.11 to approve Oregon's new and revised human health criteria. This section includes information regarding EPA's review of Oregon's human health criteria revisions which specifically evaluates the applicability of the human health criteria to Oregon's waters along with the methodology and input variables used by Oregon for their non-carcinogenic and carcinogenic criteria. This includes an evaluation of Oregon's revised fish consumption rate of 175 grams per day used to derive the State's new and revised human health criteria. Separate subsections include the EPA's action on Oregon's new methylmercury human health criteria and revised human health criteria for arsenic. Finally, this section outlines EPA's review and action on new, revised and withdrawn footnotes, withdrawn human health criteria which were replaced by more specific criteria and the Table 40 summary language.

Part V of this document contains EPA's review and action on revisions to Oregon's narrative statement at OAR 340-041-0033.

Parts VI and VII of the document contain EPA's review and approval of two implementation procedures included in the July 21, 2011 submittal – the background pollutant criteria and the revised variance provision.

Part VIII of this document includes EPA's review and action on a minor editorial change to Oregon's bacteria provision to correct a cross-referencing error.

Part IX discusses the revised rules regarding implementation of criteria by forestry and agricultural nonpoint sources. These provisions are not WQS under the CWA and therefore EPA is taking no action on them.

III. BACKGROUND

In 1999, ODEQ initiated a Water Quality Standards Review (triennial review) to update Oregon's criteria for toxic pollutants which were based on the 1986 EPA Gold Book[4] and that were contained in OAR 340-041-0033 and Table 20 of Oregon's water quality standards. This review was completed in 2003. During this review, ODEQ made significant revisions to both their aquatic life and human health criteria based on the updated EPA methodologies and science for deriving aquatic life and human health criteria that had occurred since the Gold Book had been published. The Commission adopted these new and revised water quality standards on May 20, 2004. Upon adoption, ODEQ submitted these criteria changes along with revisions to the narrative toxics provision to EPA on July 8, 2004.

One goal of Oregon's 1999-2003 WQS review was to update its human health criteria for toxic pollutants in order to reflect the latest scientific information and EPA's most recent national CWA § 304(a) human health criteria recommendations.[5] In 2000, EPA published a revised methodology for deriving § 304(a) human health criteria recommendations titled *Methodology for Deriving Ambient Water Quality Criteria for the Protection of Human Health* (hereinafter referred to as the "2000 Methodology").[6] In separate updates published in 2002 and 2003[7,8] along with 2009,[9] EPA updated the § 304(a) human health criteria recommendations to reflect this new methodology and to consider updated toxicological information in EPA's Integrated Risk Information System (IRIS).[10]

The new and revised human health criteria adopted by Oregon in 2004 were based on EPA's recommendations provided in these documents. The human health criteria were derived using a fish consumption rate of 17.5 grams per day (about 0.6 ounces per day or three 6-ounce meals per month), which represents the 90th percentile of consumption among consumers and non-consumers of fish nationwide. This is the national default fish consumption rate recommended

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[4] EPA. 1986. *Quality Criteria for Water* ("Gold Book"). U.S. Environmental Protection Agency, Office of Water, Washington, D.C. EPA 440/5-86-001. Available at: http://www.epa.gov/waterscience/criteria/library/goldbook.pdf
[5] ODEQ. 2003. *Toxic Compounds Criteria: 1999-2003 Water Quality Standards Review Issue Paper*. Oregon Department of Environmental Quality, Portland, Oregon. Available at: http://www.deq.state.or.us/about/eqc/agendas/attachments/may2004/5.20.04.ItemB.AttchH.pdf
[6] EPA. 2000. *Methodology for Deriving Ambient Water Quality Criteria for the Protection of Human Health*. U.S. Environmental Protection Agency, Office of Water, Washington, D.C. EPA-822-B-00-004. Available at: http://www.epa.gov/waterscience/criteria/humanhealth/method/complete.pdf
[7] EPA. 2002. *Revision of National Recommended Water Quality Criteria*. U.S. Environmental Protection Agency, Office of Water, Washington, D.C. *Federal Register*, Volume: 67, Issue: 249, Page: 79091 (67 FR 79091), December 27, 2002. Available at: http://www.epa.gov/fedrgstr/EPA-WATER/2002/December/Day-27/w32770.htm
[8] EPA. 2003. *National Recommended Water Quality Criteria for the Protection of Human Health*. U.S. Environmental Protection Agency, Office of Water, Washington, D.C. *Federal Register*, Volume: 68, Issue: 250, Page: 75507 (68 FR 75507), December 31, 2003. Available at: http://www.epa.gov/fedrgstr/EPA-WATER/2003/December/Day-31/w32211.htm
[9] EPA. 2009. *EPA National Recommended Water Quality Criteria.* U.S. Environmental Protection Agency Office of Water. Office of Science and Technology. Available at: http://water.epa.gov/scitech/swguidance/standards/current/upload/nrwqc-2009.pdf
[10] EPA. *Integrated Risk Information System (IRIS).* U.S. Environmental Protection Agency, Office of Water, Washington, D.C. Available at: www.epa.gov/iris

by EPA in the 2000 Methodology for use when local, regional or other data is not available. During the public process Oregon received comment regarding concerns that the fish consumption rate used in the criteria may not accurately represent Oregonian's consumption patterns. Following review of these comments ODEQ recommended, and in 2004 the Commission adopted, criteria derived using a fish consumption rate of 17.5 grams per day. However, in recognition of this expressed public concern, the Commission requested that ODEQ seek resources to conduct a fish consumption rate study in Oregon.

Following Oregon's 2004 adoption of these criteria, the Confederated Tribes of the Umatilla Indian Reservation (Umatilla Tribe) and other tribal governments raised objections to EPA, stating that the criteria did not protect tribal members who eat higher amounts of fish and for whom fish consumption is a critical part of their cultural tradition and religion. In response, EPA evaluated the protectiveness of the criteria in light of local and regional fish consumption data and initiated discussions with Oregon regarding this issue. Local data was available from a study conducted by the Columbia River Inter-Tribal Fish Commission (CRITFC)[11] (hereinafter referred to as the "CRITFC Study"), which included surveys of four Columbia River Tribes, two of whom reside in Oregon, the Confederated Tribes of the Umatilla Indian Reservation (CTUIR or Umatilla Tribe) and the Confederated Tribes of the Warms Springs Reservation. In addition, several regional fish consumption studies were also available.

Oregon was not able to obtain funding for a study of Oregon fish consumption rates specific to Oregon but did agree to review available literature and data in collaboration with EPA and the Umatilla Tribe. In the fall of 2006, ODEQ launched the fish consumption rate review project involving seven public workshops and two workgroups. The workgroups were charged with providing ODEQ with information relative to the available science and the potential implementation and fiscal concerns that may be associated with criteria based on a higher fish consumption rate. The Human Health Focus Group (HHFG), made up of public health professionals and toxicologists, reviewed the available data on fish consumption patterns in the Pacific Northwest and elsewhere. The group wrote a report[12] summarizing the science and made recommendations about the quality and appropriate use of the available information. ODEQ considered the HHFG's analysis and the other information obtained during this project to select a fish consumption rate they felt appropriate for use in developing criteria for Oregon's waters.

Oregon addressed several issues during the process of determining an appropriate fish consumption rate for Oregon. These included:

- Which studies should be considered when developing a fish consumption rate for Oregon?
- Should the criteria be based on a fish consumption rate that includes Oregonians who

[11] Columbia River Inter-Tribal Fish Commission (CRITFC). October 1994. *A Fish Consumption Survey of the Umatilla, Nez Perce, Yakama, and Warm Springs Tribes of the Columbia River Basin.* Technical Report 94.3. Available at: http://www.critfc.org/tech/94-3report.pdf
[12] ODEQ. June 2008. *Human Health Focus Group Report. Oregon Fish and Shellfish Consumption Rate Project.* Oregon Department of Environmental Quality. Available at: http://www.deq.state.or.us/wq/standards/docs/toxics/HHFGFinalReportJune2008.pdf

eat large amounts of fish and shellfish for cultural, economic, health or other reasons, or a fish consumption rate reflective of Oregon's total (general) population, including people who do not eat fish or eat it rarely?

- What proportion or percentile of the population(s) should be protected by the criteria? (Within any group, whether Native-Americans, Asian-Americans, commercial fishermen or the general population, there will be some individuals who eat more than any chosen rate and some who eat less than that rate.)
- How should the consumption of salmon (an anadromous fish) and/or marine fish be considered when determining the rate to be used for freshwaters?
- Should the same rate be used for all waters of Oregon or should multiple rates be considered based on known consumption patterns?

Following review of all the information obtained during the fish consumption rate review project, ODEQ determined that a fish consumption rate of 175 grams per day was a reasonable and protective fish consumption rate to use when driving the human health criteria applicable to Oregon's surface waters. A fish consumption rate of 175 grams per day equals approximately 6.2 ounces per day (or approximately 23 8-oz fish or shellfish meals per month). This rate represents the 95th percentile value from the CRITFC study and is within the range of the 90th percentile values from various studies from the Northwest assembled by the HHFG.[13] ODEQ found the 175 grams per day rate to be consistent with the HHFG recommendation to use 90th or 95th percentile values to represent the proportion of the population the criteria should be designed to protect. ODEQ also found the rate to be consistent with HHFG recommendations to use a fish consumption rate that represents fish consumers only, rather than a rate derived from the overall population including both consumers and non-consumers of fish, and to include salmon and other marine species in the rate. Finally, ODEQ recommended that the rate be applied statewide.[14]

On October 23, 2008, ODEQ presented the EQC with a recommendation to revise Oregon's toxics criteria for human health using a FCR of 175 grams per day.[15] The Commission agreed with this recommendation and directed ODEQ to:

1. Revise Oregon's toxics criteria for human health based on a fish consumption rate of 175 grams per person per day;

[13] EPA. June 1, 2010. Technical Support Document for Action on the State of Oregon's New and Revised Human Health Water Quality Criteria for Toxics and Revisions to Narrative Toxics Provisions Submitted on July 8, 2004. U.S. Environmental Protection Agency. See Appendix A for a summary of the studies considered by Oregon. Available at: http://www.epa.gov/region10/pdf/water/oregon-hhwqc-tsd_june2010.pdf

[14] ODEQ. May 24, 2011. *Human Health Criteria Issue Paper*. Oregon Department of Environmental Quality. pages 8-10. Available at: http://www.deq.state.or.us/wq/standards/docs/toxics/humanhealth/rulemaking/HumanHealthToxicCriteriaIssuePaper.pdf

[15] ODEQ. October 6, 2008. *Memo from Dick Pederson, Director ODEQ, to the Environmental Quality Commission. Agenda Item G, Action Item: Oregon's Fish Consumption Rate – For Use in Setting Water Quality Standards for Toxic Pollutants October 23, 2008 EQC Meeting*. Oregon Department of Environmental Quality. Available at: http://www.deq.state.or.us/about/eqc/agendas/attachments/2008oct/ItemG.pdf

2. Propose rule language that will allow ODEQ to implement the standards in National Pollutant Discharge Elimination System (NPDES) permits and other Clean Water Act programs in an environmentally meaningful and cost-effective manner;
3. Propose rule language or develop other implementation strategies to reduce the adverse impacts of toxic substances in Oregon's waters that are the result of non-point source (not via a pipe) discharges or other sources not subject to section 402 of the Clean Water Act;
4. Develop a proposed rule and implementation methods that carefully consider the costs and benefits of the fish consumption rate and the data and scientific analysis already compiled or that is developed as part of the rulemaking proceeding.

Pursuant to this directive, ODEQ established a Rulemaking Workgroup in December 2008. The purpose of this group was to provide input and feedback to ODEQ as it developed its proposed rulemaking to revise human health criteria using the revised fish consumption rate and to address potential issues associated with implementing the revised criteria. The workgroup met on a monthly basis from December 2008 until October 2010. In addition, to address the third element of the EQC directive, ODEQ formed other workgroups to address the reduction of toxic pollution from sources not regulated by NPDES permits and to assist in the development of a comprehensive, cross media toxics reduction strategy.[16]

On December 21, 2010, ODEQ issued a proposed rule for public comment that included new and revised human health criteria for toxic pollutants, a revision to their variance rule, a new background pollutant provision and several proposed additions and revisions to rules relating to the implementation of the NPDES program and nonpoint source programs. As detailed in Section I, ODEQ revised the proposed rule in response to comments received, presented it to the Commission for adoption on June 16, 2011, and submitted it to EPA on July 21, 2011.

On June 1, 2010, consistent with a Consent Decree entered in the U.S. District Court in the District of Oregon,[17] EPA acted on the revised human health criteria which Oregon had submitted to EPA on July 8, 2004. As part of this action, EPA disapproved all of Oregon's new and revised human health criteria that were derived using a fish consumption rate of 17.5 grams per day as well as three footnotes associated with those criteria and footnote K insofar as it applies to the "organism only" human health criterion for manganese. EPA found that these human health criteria, derived using a fish consumption rate of 17.5 grams per day, were not protective of Oregon's designated use of fishing consistent with the Commission's October 2008 directive. In the June 1, 2010 letter to ODEQ, EPA stated that it "believe[d] that Oregon's adoption of human health criteria consistent with the Commission's Directive to develop criteria using a fish consumption rate of 175 grams per day statewide would be adequate to address EPA's disapproval of the new and revised human health criteria as well as [3 of the 4] footnotes."[18] As part of the 2010 action, EPA approved the human health criteria for asbestos

[16] ODEQ. May 24, 2011. *Issue Paper: Implementing Water Quality Standards for Toxic Pollutants in NPDES Permits, Human Health Toxics Rulemaking.* Oregon Department of Environmental Quality. pages 8-9. Available at: http://www.deq.state.or.us/wq/standards/docs/toxics/humanhealth/rulemaking/NPDESIssuePaper.pdf
[17] *Northwest Environmental Advocates v. U.S. EPA*, No. 06-479-HA (D. Or. 2006).
[18] EPA. June 1, 2010. Letter from Michael A. Bussell, Director, Office of Water and Watersheds, EPA Region 10 to Neil Mullane, Administrator, Water Quality Division, ODEQ, *Re: EPA's Action on New and Revised Human Health Water Quality Criteria for Toxics and Revisions to Narrative Toxics Provisions in Oregon's Water Quality*

and copper since those criteria value were not derived based on a fish consumption rate, footnote K as it applies to the "water + organism criteria for iron and manganese, the withdrawal of eight human health criteria, and revisions to the narrative toxic provisions at OAR 340-041-0033(1) and (2).

A. *ODEQ'S JULY 12 AND JULY 21, 2011 SUBMITTALS*

In order to address the Commission's October 2008 directive and EPA's June 1, 2010 disapproval action, on July 21, 2011 Oregon submitted new and revised numeric human health criteria and two WQS implementation provisions to EPA for action under CWA §303(c). This submission also contained a correction to a regulatory citation in the bacteria criteria provision and several other regulatory changes that are not WQS. Revised criteria for arsenic were adopted separately by the Commission on April 21, 2011 and submitted to EPA on July 12, 2011. All of the numeric criteria adopted in these actions were derived using a fish consumption rate of 175 grams per day.

The new and revised criteria, which serve as the basis for NPDES permit limits and other regulatory decisions, are located in Oregon's WQS in a new table called Table 40. ODEQ has consolidated the human health criteria which were previously contained in Tables 20, 33A and 33B into Table 40. The adoption of the new and revised human health criteria based on a fish consumption rate of 175 grams per day is ODEQ's remedy to EPA's disapproval of ODEQ's 2004 human health criteria based on a fish consumption rate of 17.5 grams per day.

Consistent with CWA §303(c)(2)(B), in adopting these new and revised human health criteria, Oregon has adopted human health criteria for all of the priority toxic pollutants for which EPA has published criteria under CWA §304(a). Forty-eight of the 104 pollutants for which Oregon adopted new or revised human health criteria are characterized as non-carcinogens (i.e., not having the potential to cause cancer). The remaining 56 pollutants are carcinogens (i.e., having the potential to cause cancer).

The calculations that Oregon used to derive the human health criteria for non-carcinogens and carcinogens differed depending upon the primary exposure pathway appropriate to the pollutant for which the criteria were derived and are further described separately in section IV below. Oregon's criteria were adopted to protect human health from chronic (lifetime) exposure to toxic substances through drinking water and eating fish[19] obtained from surface waters. Where the criteria are derived to protect human health from exposure through both drinking water and eating fish (in combination), Oregon has adopted "water + organism" criteria. Where the criteria are derived to protect human health from exposure through eating fish alone (not in combination with drinking water), Oregon has adopted "organism only" criteria. These two sets of criteria (i.e., "water + organism" and "organism only") are reflected in the column headings of Table 40

Standards. Available at: http://www.deq.state.or.us/wq/standards/docs/toxics/EPAHHLetter20100601.pdf
[19] As used throughout this technical support document, the term "fish" refers to finfish as well as shellfish.

in Oregon's WQS. Additional information can be found in ODEQ's Human Health Criteria Issue Paper.[20]

The criteria adopted by Oregon for methylmercury and arsenic were derived using variations to the methodology used for all other criteria. Thus, those two pollutants and the methods used to derive those criteria are addressed separately below.

Additional revisions related to the human health criteria, which are discussed below, include:

- The removal of 13 pollutants consistent with EPA's removal of 304(a) recommended criteria values for these same pollutants. Most of the previous criteria recommendations addressed families of pollutants for which the criteria recommendations were withdrawn when EPA developed criteria recommendations for the individual pollutants within each family of chemicals that present the greatest human health risk.
- Several new, revised and withdrawn footnotes to the criteria in order to provide clarification.
- Revisions to the water quality standards provision at OAR 340-041-0033 which provide narrative language explaining the human health and aquatic life criteria tables.

In response to the second, third and forth directives issued by the EQC on October 23, 2008, ODEQ also revised OAR 340-041 to include two WQS implementation provisions - a revised variance procedure and a site-specific background pollutant provision – and revised rule language addressing implementation for nonpoint sources. In addition, ODEQ adopted an intake credit rule (an NPDES permitting provision) and several changes to the TMDL rules in OAR 340-042 and 045. These latter changes were not submitted to EPA for consideration under CWA 303(c), are not WQS under the CWA, and are not addressed in this action.

[20] ODEQ. May 24, 2011. *Human Health Criteria Issue Paper.* Oregon Department of Environmental Quality. Available at: http://www.deq.state.or.us/wq/standards/docs/toxics/humanhealth/rulemaking/HumanHealthToxicCriteriaIssuePaper.pdf

IV. ODEQ'S NEW AND REVISED HUMAN HEALTH CRITERIA

A. *EPA REVIEW OF OREGON'S HUMAN HEALTH CRITERIA REVISIONS*

This section contains the basis for EPA's decisions under section 303(c) of the CWA and implementing regulations found at 40 CFR § 131.11 to approve Oregon's new and revised human health criteria. This section includes information regarding EPA's review of Oregon's human health criteria revisions which specifically evaluates the applicability of the human health criteria to Oregon's waters along with the methodology and input variables used by Oregon for their non-carcinogenic and carcinogenic criteria. This includes an evaluation of Oregon's revised fish consumption rate of 175 grams per day. Separate subsections address EPA's action on Oregon's new methylmercury human health criteria and revised human health criteria for arsenic. Finally, this section outlines EPA's review and action on new, revised and withdrawn footnotes, withdrawn human health criteria which were replaced by more specific criteria and the Table 40 summary language.

1. Human Health Criteria Applicability to Oregon's Waters

Oregon's water quality standards designate beneficial uses for waters of the state for each basin in OAR 340-041-0101 to 0340 and Tables 101(A) through 340(A), incorporated into Oregon rule by reference. Oregon's designated uses consist of the following:

- Public Domestic Water Supply
- Private Domestic Water Supply
- Industrial Water Supply
- Irrigation
- Livestock Watering
- Fish and Aquatic Life
- Wildlife and Hunting
- Fishing
- Boating
- Water Contact Recreation
- Aesthetic Quality
- Hydro Power
- Commercial Navigation and Transportation

Oregon's human health criteria were developed to protect human health from long-term exposure to toxic pollutants in drinking water and through eating fish and shellfish containing these pollutants. Waters to be protected for drinking water are those designated as either "Public Domestic Water Supply" or "Private Domestic Water Supply." Waters to be protected for consumption of fish and shellfish are designated as "Fishing."

Oregon's "water + organism" criteria were established to limit the pollutant to levels that protect the safe consumption of drinking water and fish, including shellfish. These criteria are applied where Oregon has designated public or private domestic water supply, and fishing as beneficial uses. Table 1 below identifies those waters in Oregon that have both a fishing designated use and either a public domestic water supply or a private domestic water supply designated use. Both the "water + organism" criteria and the "organism only" criteria apply to these waters.

The "organism only" criteria apply where Oregon has designated a fishing use but not a domestic or private water supply use.[21] Table 2 below identifies those waters in Oregon that have a fishing designated use but neither a public domestic water supply nor a private domestic water supply designated use.

Table 1: Waters in Oregon that have both a fishing designated use as well as a public domestic water supply or a private domestic water supply designated use. Both the "water + organism" criteria and the "organism only" criteria apply to these waters.

OR WQS Table No.	Basin Name	Segment Names
101A	Mainstem Columbia River	Columbia River (Mouth to RM 86); and Columbia River (RM 86 to 309)
121A	Mainstem Snake River	Snake River (RM 176 to 409)
130A	Deschutes Basin	Deschutes River Main Stem from Mouth to Pelton Regulating Dam; Deschutes River Main Stem from Pelton Regulating Dam to Bend Diversion Dam and for the Crooked River Main Stem; Deschutes River Main Stem above Bend Diversion Dam and for the Metolious River Main Steam; and All Other Basin Stems
140A	Goose and Summer Lakes Basin	Freshwater Lakes and Reservoirs; and Freshwater Streams
151A	Grande Ronde Basin	Main Stem Grande Ronde River (RM 39 to 165) and All Other Basin Waters
160A	Hood Basin	Hood River Basin Streams
170A	John Day Basin	John Day River and All Tributaries
180A	Klamath Basin	Klamath River from Klamath Lake to Keno Dam (RM 255 to 232.5); Lost River (RM 5 to 65) and Lost River Diversion Channel; and All Other Basin Waters
190A	Malheur Lake Basin	All Rivers and Tributaries

[21] ODEQ. May 24, 2011. *Human Health Criteria Issue Paper*. Oregon Department of Environmental Quality. page 11. Available at: http://www.deq.state.or.us/wq/standards/docs/toxics/humanhealth/rulemaking/HumanHealthToxicCriteriaIssuePaper.pdf Also described in ODEQ. 2004. *Toxic Compounds Criteria. 1999-2003 Water Quality Standards Review. Issue Paper.* May 20-21, 2004 EQC Meeting. Agenda Item B, Rule Adoption: Water Quality Standards, including Toxics Criteria. Attachment H. Oregon Department of Environmental Quality. pages H-14, H-17. Available at: http://www.deq.state.or.us/about/eqc/agendas/attachments/may2004/5.20.04.ItemB.AttchH.pdf

OR WQS Table No.	Basin Name	Segment Names
201 A	Malheur River Basin	Malheur River from Namorf to Mouth; Malheur River from Beulah Dam and Warm Springs Dams to Namorf; Willow Creek from Brogan to Mouth; Willow Creek from Malheur Reservoir to Brogan; Bully Creek from Reservoir to Mouth; Malheur Reservoir, Bully Creek Reservoir, Beulah Reservoir, Warm Springs Reservoir; and Malheur River and Tributaries Upstream from Reservoirs
220A	Mid Coast Basin	Fresh Waters
230A	North Coast Basin	All Other Streams and Tributaries Thereto
250A	Owyhee Basin	Owyhee River (RM 0 to 18); Owyhee River (RM 18 to Dam); Antelope Reservoir, Cow Creek Reservoir, and Owyhee Reservoir; Owyhee River and Tributaries Upstream from Owyhee Reservoir; Main Stem of the South Fork of the Owyhee River from the Oregon-Idaho River border to Three Forks (the confluence of the North, Middle, and South Forks of Owyhee River); and Main Stem Owyhee River from Crooked Creek (RM 22) to the mouth of Birch Creek (RM 76)
260A	Powder/Burnt Basin	All Basin Waters
		Rogue River Main Stem from Estuary to Lost Creek Dam; Rogue River Main Stem above Lost Dam and Tributaries; and All Other Tributaries to Rogue River and Bear Creek
286A	Sandy Basin	Sandy River; and All Other Tributaries to Sandy River
300A	South Coast Basin	All Streams and Tributaries Thereto
310A	Umatilla Basin	Umatilla Sub-basin; Willow Creek Sub-basin; Umpqua River Main Stem from Head of Tidewater to Confluence of North and South Umpqua Rivers; North Umpqua River Main Stem; South Umpqua River Main Stem; and All Other Tributaries to Umpqua, North Umpqua, and South Umpqua Rivers
330A	Walla Walla Basin	Walla Walla River Main Stem from Confluence of North and South Forks to State Line; and All Other Basin Streams
340A	Willamette Basin	Main Stem Willamette River from Mouth to Willamette Falls, including Multnomah Channel; Main Stem Willamette River from Willamette Falls to Newberg; Main Stem Willamette River from Newberg to Salem; Main Stem Willamette River from Salem to Coast Fork; Clackamas River; Molalla River; Santiam River; McKenzie River; Tualatin River; and All Other Streams and Tributaries

Table 2: Waters in Oregon that have a fishing designated use but neither a public domestic water supply nor a private domestic water supply designated use. "Organism only" criteria apply to these waters.

OR WQS Table No.	Basin	Segment Name
140A	Goose and Summer Lakes Basin	Goose Lake; and Highly Alkaline and Saline Lakes
190A	Malheur Lake Basin	Natural Lakes
220A	Mid Coast Basin	Estuaries and Adjacent Marine Waters
230A	North Coast Basin	Estuaries and Adjacent Marine Waters
271A	Rogue Basin	Rogue River Estuary and Adjacent Marine Waters; and Bear Creek Main Stem
286A	Sandy Basin	Streams Forming Waterfalls Near Columbia River Highway
300A	South Coast Basin	Estuaries and Adjacent Marine Waters
320A	Umpqua Basin	Umpqua River Estuary to Head of Tidewater and Adjacent Marine Waters

Oregon's application of human health criteria is consistent with EPA's guidance to states and the methodology inherent in developing the criteria. EPA's *Water Quality Standards Handbook* recommends that states adopt human health criteria to protect waters designated for public water supply. In addition, for waters where fish ingestion is considered an important activity, EPA recommends that the criterion applicable to fish consumption be applied to protect the use.[22] Oregon's human health criteria are applied consistent with this recommendation.

EPA has published guidelines for developing criteria that protect human health endpoints and separate criteria guidance to protect aquatic life endpoints. Consistent with the science used to derive the criteria, EPA recommends that human health criteria be applied to uses where human health could be affected by exposure from consumption of water and/or aquatic life and aquatic life criteria be applied to uses associated with the protection of aquatic life. Thus, most states, including Oregon, have adopted two sets of criteria for toxic pollutants, one to address the effects to human health and the other to address the effects to aquatic life. For some pollutants, this results in a waterbody segment having multiple criteria for a single pollutant, in which case the WQS require the attainment of all of the applicable criteria.

Oregon's human health criteria are developed pursuant to methods presented in EPA's 2000 Human Health Methodology.[23] These criteria take into consideration the cancer potency or systemic toxicity of a pollutant, the exposure related to surface water exposure and a risk characterization. The criteria generated pursuant to the 2000 Human Health Methodology protect humans from toxicological effects from chronic exposure to a pollutant through drinking water or from eating fish living in a water body to which the criteria apply.

[22] EPA. 1994. *Water Quality Standards (WQS) Handbook: Second Edition.* August 1994. United States Environmental Protection Agency, Office of Water. EPA-823-B-94-005a. page 3-15. Available at http://water.epa.gov/scitech/swguidance/standards/handbook/index.cfm
[23] EPA. 2000. *Methodology for Deriving Ambient Water Quality Criteria for the Protection of Human Health*. EPA-822-B-00-004. Available at: http://www.epa.gov/waterscience/criteria/humanhealth/method/complete.pdf

EPA's guidance for developing aquatic life criteria recommends that such criteria use toxicity information for aquatic life, establishing pollutant levels necessary for protection of aquatic life from both short and long term effects of the pollutant.[24] Toxicity tests are used to evaluate pollutant effects on survival, growth and reproduction of aquatic organisms.

EPA has reviewed Oregon's new and revised human health criteria in order to assess whether they are sufficient to protect Oregon's designated uses from human health impacts associated with the pollutants for which they were adopted. Other endpoints and uses (e.g., Fish and Aquatic Life) are addressed by other provisions in Oregon's WQS and are not before the Agency for review under § 303(c)(3) of the CWA as part of this action.

2. Non-Carcinogens: Criteria Methodology and Input Variables Used by Oregon[25]

EPA's 2000 Human Health Methodology provides guidance for deriving human health criteria for toxic pollutants.[26] Pursuant to Section 304(a) of the CWA, EPA has published a table of recommended criteria for use by states in adopting and revising criteria.[27] For each pollutant, this table also identifies whether EPA recommends the methodology specific to carcinogens or non-carcinogens, based on information relative to the human health endpoints of greatest significance.[28] For criteria recommendations for non-carcinogens, the values in this table reflect criteria derived using the 'national default' values identified in the 2000 Methodology: the reference dose (RfD) contained in the Integrated Risk Information System (IRIS) at the time of publication; the use of EPA's recommended bioconcentration factors (BCFs) (as opposed to site-specific bioaccumulation factors (BAFs)); and relative source concentration factors (RSC) as provided by the latest 304(a) recommendations.

While the 2000 Methodology provides national default values, it also provides guidance necessary to adjust criteria to reflect local conditions and encourages states to use the guidance to appropriately reflect local conditions and/or protect identifiable subpopulations.[29] Numerous states have adopted criteria derived through the use of site-specific input variables instead of the national default values, thus ensuring the criteria are protective of the human health uses

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[24] EPA. 1985. *Guidelines for Deriving Numerical National Water Quality Criteria for the Protection of Aquatic Organisms and Their Uses.* Available at: http://water.epa.gov/scitech/swguidance/standards/criteria/aqlife/upload/85guidelines.pdf

[25] For methylmercury, Oregon used an alternate approach that will be addressed in a separate section.

[26] EPA. 2000. *Methodology for Deriving Ambient Water Quality Criteria for the Protection of Human Health*. EPA-822-B-00-004. Available at: http://www.epa.gov/waterscience/criteria/humanhealth/method/complete.pdf

[27] EPA. *National Recommend Ambient Water Quality Criteria for the Protection of Aquatic Life and Human Health*. Published pursuant to section 304(a) of the Clean Water Act. Available at: http://www.epa.gov/waterscience/criteria/wqctable/index.html

[28] EPA. 2000. *Methodology for Deriving Ambient Water Quality Criteria for the Protection of Human Health*. U.S. Environmental Protection Agency, Office of Water, Washington, D.C. EPA 822-B-00-004. pages 1-3. Available at: http://www.epa.gov/waterscience/criteria/humanhealth/method/complete.pdf

[29] EPA. 2000. *Methodology for Deriving Ambient Water Quality Criteria for the Protection of Human Health*. U.S. Environmental Protection Agency, Office of Water, Washington, D.C. EPA 822-B-00-004. pages iii, 1-11. Available at: http://www.epa.gov/waterscience/criteria/humanhealth/method/complete.pdf

designated in the waters where those criteria apply.

Criteria calculated pursuant to the 2000 Methodology are derived by applying a number of pollutant-specific and general risk-assessment values to an equation that generates a criteria protective of human health uses. Where a state uses this equation to develop criteria, the protectiveness of those criteria are dependent on whether the values used for each input variable are appropriate for protection of the uses specific to a pollutant and/or waterbody. With the exception of the methylmercury criterion, Oregon has directly applied this equation when deriving the new or revised human health criteria for the non-carcinogenic pollutants included in EPA's 2009 table of 304(a) criteria recommendations.[30] A simplified version of this equation is provided in Figure A below, followed by a discussion of the variables in the equation and the values utilized by Oregon to derive their new and revised criteria, and supporting information provided by Oregon. EPA's review of the protectiveness of the criteria is contained in a later subsection.

Figure A: Simplified version of the equation used by Oregon in deriving the human health criteria for non-carcinogens.

$$AWQC = RfD \bullet RSC \bullet \frac{(BW)}{[DI + (FCR \bullet BAF)]}$$

where:

AWQC	=	Ambient Water Quality Criterion (milligrams per liter)
RfD	=	Reference dose for noncancer effects (milligrams per kilogram per day)
RSC	=	Relative source contribution factor to account for non-water sources of exposure (unitless)
BW	=	Human body weight (kilograms)
DI	=	Drinking water intake (liters per day)
FCR	=	Fish Consumption Rate (kilograms per day)
BAF	=	Bioaccumulation factor (liters per kilogram)

a) Reference Done (RfD)

For non-carcinogens, EPA's 2000 Methodology recommends deriving human health criteria using a reference dose. A reference dose is defined as "an estimate (with uncertainty spanning approximately an order of magnitude) of a daily exposure to the human population (including sensitive subgroups) that is likely to be without appreciable risk of deleterious effects over a lifetime."[31] In other words, individuals should not suffer from appreciable risks of deleterious effects if their exposure to a chemical is at or below the reference dose for that chemical. Thus,

[30] EPA. 2009. *EPA National Recommended Water Quality Criteria.* U.S. Environmental Protection Agency Office of Water. Office of Science and Technology. Available at: http://water.epa.gov/scitech/swguidance/standards/current/upload/nrwqc-2009.pdf

[31] EPA. 1993. *Reference Dose (RfD): Description and Use in Health Risk Assessments. Integrated Risk Information System (IRIS).* Intra-Agency Reference Dose (RfD) Work Group, Office of Health and Environmental Assessment, Environmental Criteria and Assessment Office, U.S. Environmental Protection Agency, Cincinnati, OH. Available at: http://www.epa.gov/ncea/iris/rfd.htm

the reference dose serves as a threshold level and is specific to each individual pollutant.

In deriving both the "water + organism" and "organism only" criteria for non-carcinogens, Oregon utilized the most recent reference doses recommended by EPA's current § 304(a) criteria.

b) Body Weight (BW)

Oregon used EPA's national default value of 70 kilograms for the body weight as recommended in the 2000 Methodology. The source of data for the human body weight value of 70 kilograms is the *National Health and Nutrition Examination Survey* (NHANES) conducted between 1988 and 1994 using a nationwide probability sample of over 30,000 persons. Body weights of 73 percent of those individuals included in the survey were carefully measured by survey staff (i.e., weights were not self-reported). The mean body weight value for men and women ages 18-74 years old from this survey was 75.6 kilograms. Another survey by the National Cancer Institute measured a mean body weigh value of 70.5 kilograms for adults aged 20-64 years old, and EPA's *Exposure Factors Handbook* recommends 71.8 kilograms for adults based on an earlier NHANES survey.[32] While these data are slightly higher than 70 kilograms, the derivation of cancer slope factors identified in EPA's IRIS database are based upon a body weight of 70 kilograms. Since consistency is advocated between the dose-response relationship and the exposure factors, a default value of 70 kilograms was recommended by EPA for use in deriving human health water quality criteria.[33]

c) Drinking Water Intake Rate (DI)

Oregon used EPA's national default value of two liters per day for the drinking water intake rate as recommended in the 2000 Methodology. This rate was based on the 1994-1996 *Continuing Survey of Food Intake by Individuals* (hereinafter referred to as the "CSFII survey") conducted by the U.S. Department of Agriculture. This rate represents the 86th percentile of drinking water intake data for adults collected from the CSFII survey.[34] While this rate was utilized for "water + organisms" criteria, a drinking water intake rate of zero liters per day was used for "organism only" criteria because the criteria are not intended to address human health effects from the consumption of drinking water.

d) Bioaccumulation/Bioconcentration Factor (BAF/BCF)

Bioconcentration factors (BCF) describe the uptake and retention of a pollutant by an aquatic organism from water only while bioaccumulation factors (BAF)describe the uptake and retention of a pollutant by an aquatic organism from all sources (e.g., water, ingestion, and sediment). The

[32] EPA. 1997. *Exposure Factors Handbook*. U.S. Environmental Protection Agency, National Center for Environmental Assessment, Office of Research and Development, Washington, D.C. EPA/600/P-95/002Fa. Available at: http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=12464
[33] EPA. 2000. *Methodology for Deriving Ambient Water Quality Criteria for the Protection of Human Health*. U.S. Environmental Protection Agency, Office of Water, Washington, D.C. EPA 822-B-00-004. pages 4-18 to 4-19. Available at: http://www.epa.gov/waterscience/criteria/humanhealth/method/complete.pdf
[34] EPA. 2000. *Methodology for Deriving Ambient Water Quality Criteria for the Protection of Human Health*. U.S. Environmental Protection Agency, Office of Water, Washington, D.C. EPA 822-B-00-004. pages 4-21 to 4-22. Available at: http://www.epa.gov/waterscience/criteria/humanhealth/method/complete.pdf

magnitude of bioconcentration or bioaccumulation by aquatic organisms varies widely depending upon the pollutant but can be extremely high for some highly persistent and hydrophobic pollutants. For highly bioaccumulative pollutants, concentrations in aquatic organisms may pose unacceptable human health risks from fish consumption even when concentrations in water are too low to cause unacceptable health risks from drinking water consumption alone. EPA's 2000 Human Health Methodology recommends the use of national BAFs in the calculation of ambient water quality criteria. However, to date, EPA has only provided guidance on the calculation of national BAFs. BAF values have not been calculated for individual pollutants. EPA uses bioconcentration factors in their nationally recommended criteria. As explained below, States have the option to use these BCFs or to calculate BAFs using guidance documents published by EPA.

EPA's 2000 Human Health Methodology provides guidance on developing bioaccumulation factors for the protection of human health.[35] A subsequent technical support document to the 2000 Methodology entitled *Technical Support Document Volume 2: Development of National Bioaccumulation Factors* (2003) provides added detail to the BAF calculation procedures outlined in the Methodology.[36] In 2009, EPA published the *Technical Support Document Volume 3: Development of Site-Specific Bioaccumulation Factors.* This document provides guidance on different approaches that investigators can take to develop site-specific BAFs, and the factors that should be considered when selecting an approach for a given situation.[37]

EPA recommends that states use these methods when adopting human health criteria. Neither of the bioaccumulation technical support documents should be used alone to derive BAFs but should be used in conjunction with the 2000 Human Health Methodology. The bioaccumulation methodology documents encourage developing site-specific BAFs because EPA recognizes that BAFs vary not only between chemicals and trophic levels, but also among different ecosystems and waterbodies. National average BAF values for a given chemical and trophic level may not provide the most accurate estimate of bioaccumulation for certain water bodies in the United States. At a given location, the BAF for a chemical may be higher or lower than the national BAF, depending on the nature and extent of site-specific influences.

While EPA's 2000 Human Health Methodology recommends the use of bioaccumulation factors in deriving human health criteria, development of bioaccumulation factors is a time and resource intensive process and BAFs can vary from site-to-site. Thus, it is difficult to develop BAFs on a national or statewide scale and this has rarely been done. Therefore, until such time as

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[35] EPA. 2000. *Methodology for Deriving Ambient Water Quality Criteria for the Protection of Human Health*. U.S. Environmental Protection Agency, Office of Water, Washington, D.C. EPA-822-B-00-004. Section 5. Available at: http://www.epa.gov/waterscience/criteria/humanhealth/method/complete.pdf

[36] EPA. December 2003. *Methodology for Deriving Ambient Water Quality Criteria for the Protection of Human Health (2000).* Technical Support Document Volume 2: Development of National Bioaccumulation Factors. Available at: http://water.epa.gov/scitech/swguidance/standards/upload/2005_05_06_criteria_humanhealth_method_tsdvol2.pdf

[37] EPA. September 2009. *Methodology for Deriving Ambient Water Quality Criteria for Protection of Human Health (2000).* Technical Support Document Volume 3: Development of Site-Specific Bioaccumulation Factors. Available at: http://water.epa.gov/scitech/swguidance/standards/criteria/health/methodology/upload/2008_07_01_criteria_humanhealth_method_tsdvol3.pdf

bioaccumulation factors are developed, EPA's national CWA § 304(a) human health criteria guidance values continue to be based upon the use of bioconcentration factors which reflect the uptake and retention of a pollutant by an aquatic organism from water alone. Given the lack of any Oregon-specific BAFs and consistent with EPA guidance, Oregon utilized bioconcentration factors instead of bioaccumulation factors in deriving its new and revised human health criteria. The bioconcentration factors utilized by Oregon are pollutant-specific and are consistent with the bioconcentration factors recommended by EPA in the most recent national CWA § 304(a) human health criteria recommendations.

e) Fish Consumption Rate (FC)

When establishing a single value/criterion as a regulatory endpoint, States and EPA must make several policy decisions relative to the members of the population that will be protected when using the waters for activities protected by the designated uses and the established criteria. In EPA's 2000 Human Health Methodology, EPA provides guidance to the States on the use of local and regional data to develop an appropriate fish consumption rate for the use in criteria derivation and encourages the states to use this data to determine the level of protection appropriate for State waters.

Between 2006 and 2008 Oregon conducted extensive outreach and information gathering and consulted with a group of public health experts (the Human Health Focus Group (HHFG)) in order to inform their decision-making regarding an appropriate fish consumption rate for use in developing human health criteria for Oregon. Based on the information gathered in this effort and the review of available fish consumption studies, ODEQ concluded that a fish consumption rate of 175 grams per day (about 23, 8 ounce fish meals per month) is a protective rate to use as the basis for Oregon's human health criteria. Oregon found that this rate reflected the goal of providing sufficiently clean water in the state such that people who wish to regularly eat fish for cultural, health or economic reasons may do so without risk of adverse health effects due to contaminants contained in the fish.[38]

Further detail regarding Oregon's process, information considered and the decision to use a fish consumption rate of 175 grams per day is available in Oregon's Human Health Criteria Issue Paper and the Human Health Focus Group Report and outlined in a separate EPA memo.[39]

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[38] ODEQ. May 2011. *Response to Comments: Proposed Water Quality Standards for Human Health and Water Quality Standards Implementation Policies.* Oregon Department of Environmental Quality. page 21. Available at: http://www.deq.state.or.us/wq/standards/docs/toxics/humanhealth/rulemaking/ResponseToComments.pdf
ODEQ. June 2, 2011. Memorandum from Dick Pedersen to Environmental Quality Commission; *Agenda item C, Rule adoption: Revised water quality standards for human health and revised water quality standards implementation policies*, June 15-17, EQC meeting. Oregon Department of Environmental Quality. page 5. Available at: http://www.deq.state.or.us/about/eqc/agendas/attachments/2011june/C-WQStdsStaffRpt.pdf

[39] ODEQ. May 24, 2011. *Human Health Criteria Issue Paper.* Oregon Department of Environmental Quality. At: http://www.deq.state.or.us/wq/standards/docs/toxics/humanhealth/rulemaking/HumanHealthToxicCriteriaIssuePaper.pdf
ODEQ. June 2008. *Human Health Focus Group Report. Oregon Fish and Shellfish Consumption Rate Project.* Oregon Department of Environmental Quality. Available at: http://www.deq.state.or.us/wq/standards/docs/toxics/HHFGFinalReportJune2008.pdf
EPA. October 17, 2011. Memorandum from Jannine Jennings to Record. *Fish Consumption Rate Analysis – Oregon's New and Revised Human Health Water Quality Criteria for Toxics and Associated Implementation Provisions Submitted July 12 and 21, 2011.*

f) Relative Source Contribution (RSC)

Criteria for pollutants that are non-carcinogens are based on a total cumulative dose over time that causes an observable effect. Because the human health water quality criteria address exposure only through drinking water and eating fish and not from other sources (e.g. skin absorption, inhalation, other foods and occupational exposure), a relative source contribution (RSC) factor is used to calculate the criteria. The RSC represents the proportion of exposure from water and fish relative to the total exposure (including water and fish - and other exposures such as air, food, dermal, etc.). This estimate allows for adjustment of the criteria value to reflect exposure from only water and fish. This is intended to make sure that the total exposure from all sources does not exceed the reference dose for lifetime exposure.

Developing an RSC value for a pollutant requires an evaluation of both the sources of potential exposure and quantifying the relative exposure from each source. EPA has derived RSC values for 17 of the pollutants with 304(a) recommended human health criteria. Most of these RSC values were developed by EPA's drinking water program under the Safe Drinking Water Act.

Oregon used 15 of the 17 RSC values recommended by EPA. These 15 RSC values are listed in table 5 below. Oregon chose to use RSC values that vary from those recommended by EPA for endrin (80% instead of 20%, discussed in more detail below) and methylmercury (a value of zero instead of 2.7×10^{-5} mg methylmercury/kg/day, discussed in the methylmercury section below).

Table 5: Criteria where Oregon applied EPA's recommended RSC values.

Pollutant	RSC Value
Antimony	40%
Chlorobenzene	20%
Chlorodibromomethane	80%
Cyanide	20%
Ethylbenzene	20%
gamma-BHC (Lindane)	20%
Hexachlorcyclopentadiene	20%
Thallium	20%
Toluene	20%
1,1,2-Trichloroethane	20%
1,1-Dichloroethylene	20%
1,2,4-Trichlorobenzene	20%
1,2-Dichlorobenzene(o)	20%
1,2-trans-Dichloroethylene	20%
1,4-Dichlorobenzene(p)	20%

RSC for Endrin

EPA's recommended RSC value of 20% for endrin was developed by the drinking water program and takes into account exposure through multiple pathways. Endrin is a pesticide that was banned under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) in the 1980s, thus limiting current sources of exposure. Following the review of available data and

information, ODEQ determined that an RSC of 80% was appropriate for use in deriving the human health criteria for endrin.[40] Oregon's rationale is described below.

Due to the chemical properties of endrin and its prohibition by FIFRA in the 1980s, ODEQ believes it is unlikely that people in Oregon would gain only 20% of their exposure from water and fish while gaining 80% of their exposure from other sources identified in the RSC calculation performed by EPA and used in EPA's recommended 304(a) criteria.[41] The 80% RSC calculation for endrin used by Oregon accounts for the two main sources of exposure which they considered to have a potential to impact human health in Oregon: (1) drinking water and (2) the bioconcentration of endrin in aquatic organisms and thus potential accumulation in fish tissue. ODEQ found that the other sources or routes of exposure to endrin considered by EPA were not expected to occur in Oregon for the following reasons:

> 1) The use of endrin has been banned in the US since the 1980s. Endrin is not mobile in soil, it volatizes into the air rapidly, and has a conservative half life estimate in soil of 14 years.
>
> 2) The U.S. Food and Drug Administration concluded in 1995 that exposure to endrin through food products was no longer a concern, thus reducing concerns regarding exposure to endrin from food sources.
>
> 3) The one possible route of exposure to endrin that was identified in the literature was at hazardous waste sites where endrin has been detected in contaminated soils; however, no such sites were identified in Oregon. [42,43]

Based on the above considerations, Oregon found that human health exposure to endrin through routes other than fish tissue and drinking water is unlikely. In addition, although endrin bioconcentrates in aquatic organisms, it is not very soluble in water and therefore is not likely to be found in drinking water sources. Since the bioconcentration factor used to derive the human health criteria is very high (3970), the endrin criteria values for "water + organism" and "organism only" are the same when rounded to significant digits.[44] Therefore, Oregon concluded that the primary routes of exposure for endrin are anticipated to be through

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[40] ODEQ. May 24, 2011. *Human Health Criteria Issue Paper.* Oregon Department of Environmental Quality. pages 14-15. Available at: http://www.deq.state.or.us/wq/standards/docs/toxics/humanhealth/rulemaking/HumanHealthToxicCriteriaIssuePaper.pdf
[41] ODEQ. May 24, 2011. *Human Health Criteria Issue Paper.* Oregon Department of Environmental Quality. pages 14-15. Available at: http://www.deq.state.or.us/wq/standards/docs/toxics/humanhealth/rulemaking/HumanHealthToxicCriteriaIssuePaper.pdf
[42] U.S. Department of Health and Human Services. August 1996. *Toxicological Profile for Endrin.* Public Health Service. Agency for Toxic Substances and Disease Registry. Available at: http://www.atsdr.cdc.gov/toxprofiles/tp89.pdf
[43] ODEQ. May 24, 2011. *Human Health Criteria Issue Paper.* Oregon Department of Environmental Quality. pages 14-15. Available at: http://www.deq.state.or.us/wq/standards/docs/toxics/humanhealth/rulemaking/HumanHealthToxicCriteriaIssuePaper.pdf
[44] ODEQ. May 24, 2011. *Human Health Criteria Issue Paper.* Oregon Department of Environmental Quality. pages 14-15. Available at: http://www.deq.state.or.us/wq/standards/docs/toxics/humanhealth/rulemaking/HumanHealthToxicCriteriaIssuePaper.pdf

bioconcentration in aquatic organisms and its accumulation in fish tissue. These two exposure routes have already been accounted for through the BCF and fish consumption rate.

The purpose of the RSC is to ensure that the level of a chemical allowed by a criterion or multiple criteria, when combined with other identified sources of exposure common to the population of concern, will not result in exposures that exceed the RfD.[45] Where a state reviews exposure data and develops an alternate RSC value, EPA recommends that the RSC not be lower than 20% or higher than 80%.[46] Where it can be demonstrated that other sources and routes of exposure are not anticipated for the chemical in question (based on information about its known/anticipated uses and chemical/physical properties), EPA recommends a ceiling of 80%. This 80% ceiling is a way to provide adequate protection for those who experience exposures (from any or several sources) higher than available data may indicate.[47] Oregon adjusted the RSC value for endrin to 80% consistent with this guidance.[48]

3. Carcinogens: Criteria Methodology and Input Variables Used by Oregon[49]

As noted above, EPA's 2000 Methodology provides guidance for deriving human health criteria for toxic pollutants[50] and has published a table of recommended criteria for use by states in adopting and revising criteria.[51] For human health criteria, the values in this table reflect criteria derived using all of the 'national default' values identified in the 2000 Methodology, the reference dose (RfD) contained in the Integrated Risk Information System (IRIS) at the time of publication, the use of EPA's recommended bioconcentration factors (BCFs), relative source contribution factors (RSC) as provided by the latest 304(a) recommendations and a 10^{-6} carcinogenic risk factor. While the 2000 Methodology provides national default values, it also provides necessary guidance to adjust criteria to reflect local conditions and encourages states to use the guidance to appropriately reflect local conditions and/or protect identifiable subpopulations.[52] Numerous states have adopted criteria derived through the use of site-specific input variables or a carcinogenic risk level other than $1x10^{-6}$.

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[45] November 3, 2000. *Federal Register*, Volume: 65, Issue: 214, pages: 66472-3 (65 FR 66472-3). Available at: http://www.epa.gov/fedrgstr/EPA-WATER/2000/November/Day-03/w27924.htm
[46] November 3, 2000. *Federal Register*, Volume: 65, Issue: 214, pages: 66472-3 (65 FR 66472-3). Available at: http://www.epa.gov/fedrgstr/EPA-WATER/2000/November/Day-03/w27924.htm
[47] November 3, 2000. *Federal Register*, Volume: 65, Issue: 214, pages: 66472-3 (65 FR 66472-3). Available at: http://www.epa.gov/fedrgstr/EPA-WATER/2000/November/Day-03/w27924.htm
[48] ODEQ. May 24, 2011. *Human Health Criteria Issue Paper*. Oregon Department of Environmental Quality. pages 14-15. Available at: http://www.deq.state.or.us/wq/standards/docs/toxics/humanhealth/rulemaking/HumanHealthToxicCriteriaIssuePaper.pdf
[49] Note: For arsenic, Oregon used an alternate approach that will be addressed in section IV.E of this document.
[50] EPA. 2000. *Methodology for Deriving Ambient Water Quality Criteria for the Protection of Human Health*. U.S. Environmental Protection Agency, Office of Water, Washington, D.C. EPA-822-B-00-004. Available at: http://www.epa.gov/waterscience/criteria/humanhealth/method/complete.pdf
[51] EPA. *National Recommend Ambient Water Quality Criteria for the Protection of Aquatic Life and Human Health*. Published pursuant to section 304(a) of the Clean Water Act. Available at: http://www.epa.gov/waterscience/criteria/wqctable/index.html
[52] EPA. 2000. *Methodology for Deriving Ambient Water Quality Criteria for the Protection of Human Health*. U.S. Environmental Protection Agency, Office of Water, Washington, D.C. EPA 822-B-00-004. pages iii, 1-11. Available at: http://www.epa.gov/waterscience/criteria/humanhealth/method/complete.pdf

For carcinogens, EPA's 2000 Methodology recognizes that states have the flexibility to adopt human health criteria within a risk level range of 1×10^{-6} to 1×10^{-5}, as long as highly exposed populations would at least be protected at the 1×10^{-4} (1:10,000) risk level. Furthermore, the 2000 Methodology recognizes that states have the flexibility to adopt human health criteria that protect the general population at a more protective risk level or target the protection of a higher proportion of its population at the targeted risk level. Oregon's new and revised criteria for carcinogens (except arsenic) target the protection of high consumers at the 1×10^{-6} risk level through the use of a fish consumption rate representative of the 95th percentile consumption from a study of a highly exposed subpopulation.

EPA's 2000 Methodology describes procedures that can be used as guidance by states for deriving human health water criteria. The 2000 Methodology includes an equation that Oregon used in deriving the "water + organism" and "organism only" new and revised human health criteria for 56 carcinogens. A simplified version of this equation is provided below in Figure B. Descriptions of the variables included in these equations, and the values that Oregon utilized for each variable, are also provided below.

Figure B: Simplified version of the equation used by Oregon in deriving the human health criteria for carcinogens.

$$AWQC = \frac{(\text{Risk Level} \bullet BW)}{[CSF \bullet (DI + (FCR \bullet BAF))]}$$

where:

AWQC	=	Ambient Water Quality Criterion (milligrams per liter)
Risk Level	=	Risk level (unitless)
CSF	=	Cancer slope factor (milligrams per kilogram per day)
BW	=	Human body weight (kilograms)
DI	=	Drinking water intake (liters per day)
FCF	=	Fish Consumption Rate (kilograms per day)
BAF	=	Bioaccumulation factor (liters per kilogram)

a) Body Weight, Drinking Water Intake Rate, Bioaccumulation/Bioconcentration Factor and Fish Consumption Rate

Four of the input variables used by Oregon in deriving its numeric human health water quality criteria for carcinogens are the same as those used by Oregon in deriving its numeric human health water quality criteria for non-carcinogens. A body weight of 70 kilograms and a drinking water intake of two liters per day were used, consistent with the default values that EPA utilized in deriving its national CWA § 304(a) human health criteria guidance values. Oregon also used bioconcentration factors consistent with those used by EPA in deriving its national CWA § 304(a) human health criteria guidance values.

Consistent with the criteria for non-carcinogens, a fish consumption rate of 175 grams per day was used in deriving the new and revised human health criteria for carcinogens. This value was

used by Oregon following an evaluation of local and regional data (discussed in greater detail above).

b) Cancer Slope Factor

For toxic pollutants identified as carcinogens and assumed to exhibit a linear dose-response relationship at low doses, EPA derives its national CWA § 304(a) human health criteria recommendations to correspond to incremental lifetime cancer risk levels, applying a risk management policy that ensures a reasonable level of protection for the general population.[53] Accordingly, a cancer slope factor is included in the calculation. A cancer slope factor expresses incremental, lifetime risk of cancer as a function of the rate of intake of the contaminant, and is combined with exposure assumptions to express that risk in terms of an ambient water concentration. Cancer slope factors are specific to individual pollutants. In deriving both the "water + organism" and "organism only" human health criteria for carcinogens, Oregon utilized the cancer slope factors recommended by EPA.

c) Carcinogenic Risk Level

EPA has identified a risk level range of 1×10^{-6} (1:1,000,000) to 1×10^{-5} (1:100,000) to be an appropriate risk management goal for the general population. EPA characterizes this acceptable risk range as the "upper-bound estimate of excess lifetime cancer risk," ranging from one case in a population of one million to one case in a population of one hundred thousand. The nationally recommended 304(a) criteria are intended to protect the general population at a cancer risk of 1×10^{-6}.

EPA's 2000 Methodology states that criteria based on a 10^{-5} risk level are acceptable for the general population as long as States and authorized Tribes ensure that the risk to more highly exposed subgroups (sport fishers or subsistence fishers) does not exceed the 10^{-4} risk level. If a state does not find that the 1×10^{-6} risk level adequately protects highly exposed populations, it has the flexibility to adopt water quality criteria based on a more stringent risk level or at a level more representative of highly exposed population groups. This flexibility extends to all variables used to calculate the criteria.[54]

Except where specifically identified, Oregon's new and revised human health criteria for carcinogens are calculated using a risk level of 1×10^{-6} (1:1,000,000). As discussed earlier, these criteria include the use of a fish consumption rate of 175 grams per day, a level representative of high fish consumers in the state. Oregon's goal in adopting the criteria was to protect high end consumers (as opposed to the general population) at a risk level of 10^{-6}.

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[53] EPA. 2000. *Revisions to the Methodology for Deriving Ambient Water Quality Criteria for the Protection of Human Health (2000)*. U.S. Environmental Protection Agency, Office of Water, Washington, D.C. *Federal Register*, Volume: 65, Issue: 214, page: 66443 (65 FR 66443), November 3, 2000. Available at: http://www.epa.gov/fedrgstr/EPA-WATER/2000/November/Day-03/w27924.htm

[54] EPA. 2000. *Methodology for Deriving Ambient Water Quality Criteria for the Protection of Human Health*. U.S. Environmental Protection Agency, Office of Water, Washington, D.C. EPA 822-B-00-004. page 2-6. Available at: http://www.epa.gov/waterscience/criteria/humanhealth/method/complete.pdf

4. EPA Review of Input Variables for All New and Revised Human Health Criteria except Methylmercury and Arsenic[55]

As discussed above, EPA's 2000 Human Health Methodology provides guidance for deriving human health criteria for toxic pollutants. For each variable used in the criteria calculation, EPA provides a "national default value" and guidance on specific adjustments that may be necessary to reflect local conditions and/or protect identifiable subpopulations. As part of evaluating whether Oregon's criteria protect the designated uses, EPA looked at the input values used by Oregon and whether there was Oregon-specific information relative to each value that should be considered in the review.

EPA has not identified any local or regional data to indicate that the national values used by Oregon for the reference dose, relative source contribution, body weight, drinking water intake rate, or bioaccumulation factors are inappropriate for use in Oregon.

EPA's review indicates that there is local and regional fish consumption data available and that it should be considered consistent with EPA's 2000 Methodology. The 2000 Methodology recognizes the variability of fish consumption rates among population groups and by geographic region. In employing the 2000 Methodology to derive criteria, EPA urges States and Tribes to use a fish intake level derived from local or regional data instead of the national default recommendation to ensure the fish intake level chosen is protective of highly exposed subpopulations. A four preference hierarchy concerning the use of fish consumption rate data is set forth: (1) use of local data; (2) use of data reflecting similar geography/population groups; (3) use of data from national surveys; and (4) use of EPA's default intake rate.

As discussed in greater detail above, in 1996 Oregon initiated an extensive review of the fish consumption rate used for deriving its human health criteria. This process resulted in ODEQ and the Commission determining that a fish consumption rate of 175 grams per day was a reasonable and protective fish consumption rate to use as the basis for Oregon's human health criteria. EPA has reviewed the available information and the basis for ODEQ's determination and has found that Oregon has considered all relevant local and regional data, applied that data consistent with EPA's 2000 Methodology to select a fish consumption rate that would result in a level of protection consistent with that recommended by EPA in the 2000 Methodology. Thus, EPA finds that the FCR utilized to derive Oregon's criteria is consistent with EPA's recommendations in the 2000 Methodology.

B. *EPA ACTION ON ODEQ'S NEW HUMAN HEALTH CRITERIA*

ODEQ has adopted new human health criteria for 41 pollutants (excluding methylmercury which is discussed in further detail below). Previously, Oregon did not have EPA-approved values for these criteria in their WQS. These new criteria, found in Table 40 of Oregon's WQS, are

[55] Methylmercury and arsenic are addressed in sections IV.D and IV.E of this document.

consistent with EPA's current 304(a) criteria recommendations and utilize the 175 grams per day fish consumption rate.

Table 6: Oregon's new human health criteria.

No.	Pollutant	Carcinogen	Water + Organism (µg/L)	Organism Only (µg/L)
1	Acenaphthene		95	99
2	Anthracene		2900	4000
3	Benzo(a)anthracene	✓	0.0013	0.0018
4	Benzo (a)pyrene	✓	0.0013	0.0018
5	Benzo(b)fluoranthene 3,4	✓	0.0013	0.0018
6	Benzo(k)fluoranthene	✓	0.0013	0.0018
7	Bromoform	✓	3.3	14
8	Butylbenzyl phthalate		190	190
9	Chlorobenzene		74	160
10	Chlorodibromomethane	✓	0.31	1.3
11	Chloronaphthalene 2		150	160
12	Chlorophenol 2		14	15
13	Chrysene	✓	0.0013	0.0018
14	DDD 4,4'	✓	0.000031	0.000031
15	DDE 4,4'	✓	0.000022	0.000022
16	DDT 4,4'	✓	0.000022	0.000022
17	Dibenzo(a,h)anthracene	✓	0.0013	0.0018
18	Dichlorobenzene(o) 1,2		110	130
19	Dichlorobenzene(p) 1,4		16	19
20	Dichlorobromomethane	✓	0.42	1.7
21	Dichloroethylene 1,1		230	710
22	Dichloroethylene trans 1,2		120	1000
23	Dichloropropane 1,2	✓	0.38	1.5
24	Dimethylphenol 2,4		76	85
25	Dinitrophenol 2,4		62	530
26	Dinitrophenols		62	530
27	Diphenylhydrazine 1,2	✓	0.014	0.020
28	Endosulfan alpha		8.5	8.9
29	Endosulfan beta		8.5	8.9
30	Endosulfan sulfate		8.5	8.9
31	Endrin aldehyde		0.030	0.030
32	Fluorene		390	530
33	Heptachlor epoxide	✓	0.0000039	0.0000039
34	Indeno(1,2,3-cd)pyrene	✓	0.0013	0.0018
35	Methyl bromide		37	150
36	Methyl-4,6-dinitrophenol 2		9.2	28
37	Methylene chloride	✓	4.3	59
38	Nitrosodi-n-propylamine, N	✓	0.0046	0.051
39	Pyrene		290	400
40	Trichlorobenzene 1,2,4		6.4	7.0
41	Zinc		2100	2600

EPA Approval
In accordance with its Clean Water Act authority, 33 U.S.C § 1313(c)(3) and 40 C.F.R. part 131, EPA approves Oregon's new human health toxic criteria for these 41 pollutants that are consistent with EPA's current CWA § 304(a) criteria recommendations because they are protective of Oregon's fishing and water supply designated uses.

EPA Rationale
EPA's WQS regulations at 40 C.F.R. 131 require that criteria protect the designated uses. As noted previously, Oregon's human health criteria apply to waters with fishing and water supply uses and thus must be established at a level that will protect those uses. Therefore, EPA must evaluate whether the criteria protect Oregon's human health uses.

EPA's 2000 Human Health Methodology provides guidance for deriving human health criteria for toxic pollutants. For each variable used in the criteria calculation, EPA provides a "national default value" and guidance on specific adjustments that may be necessary to reflect local conditions and/or protect identifiable subpopulations. As part of evaluating whether Oregon's criteria protect the designated uses, EPA looked at the input values used by Oregon and whether there was Oregon-specific information relative to each value that should be considered in the review. As discussed above EPA has found that ODEQ has appropriately considered local and regional data in selecting input variables for use in deriving the criteria identified in Table 6.

The 2000 Methodology document provides an extensive technical basis and justification as to how EPA's recommended human health criteria adequately protect human health uses. Oregon's new criteria were developed consistent with these recommendations, therefore, EPA has determined that Oregon's new criteria protect human health uses in accordance with 40 C.F.R. Part 131.11(a)(1).

C. *EPA ACTION ON ODEQ'S REVISED HUMAN HEALTH CRITERIA*

ODEQ has adopted revised human health criteria for 62 pollutants (excluding arsenic which is described in further detail below). These revised criteria, found in Table 40 of Oregon's WQS, are consistent with EPA's current 304(a) criteria recommendations and utilize the 175 grams per day fish consumption rate.

Table 7: Oregon's revised human health criteria.

No.	Pollutant	Carcinogen	Water + Organism (µg/L)	Organism Only (µg/L)
1	Acrolein[56]		0.88	0.93
2	Acrylonitrile	✓	0.018	0.025
3	Aldrin	✓	0.0000050	0.0000050
4	Antimony		5.1	64

[56] Based on June 10, 2009 updates to EPA's IRIS system, Oregon's previous ADI value of 15.6 ug/kgram per day was replaced with an RfD value of 5.0×10^{-4}. EPA. *Integrated Risk Information System (IRIS).* U.S. Environmental Protection Agency, Office of Water, Washington, D.C. Available at: www.epa.gov/iris

No.	Pollutant	Carcinogen	Water + Organism (µg/L)	Organism Only (µg/L)
5	Benzene	✓	1.6	5.1
6	Benzidine	✓	0.000018	0.000020
7	BHC Alpha	✓	0.00045	0.00049
8	BHC Beta	✓	0.0016	0.0017
9	BHC Gamma (Lindane)		0.17	0.18
10	Carbon tetrachloride	✓	0.10	0.16
11	Chlordane	✓	0.000081	0.000081
12	Chloroethyl ether bis 2	✓	0.020	0.05
13	Chloroform[57]		260	1100
14	Chloroisopropyl ether bis 2		1200	6500
15	Chloromethyl ether, bis	✓	0.000024	0.000029
16	Cyanide[G]		130	130
17	Dichlorobenzene(m) 1,3		80	96
18	Dichlorobenzidine 3,3'	✓	0.0027	0.0028
19	Dichloroethane 1,2	✓	0.35	3.7
20	Dichlorophenol 2,4		23	29
21	Dichloropropene 1,3	✓	0.30	2.1
22	Dieldrin	✓	0.0000053	0.0000054
23	Diethyl phthalate		3800	4400
24	Dimethyl phthalate		84000	110000
25	Di-n-butyl phthalate		400	450
26	Dinitrotoluene 2,4	✓	0.084	0.34
27	Dioxin (2,3,7,8-TCDD)	✓	0.00000000051	0.00000000051
28	Endrin		0.024	0.024
29	Ethylbenzene		160	210
30	Ethylhexyl phthalate bis 2	✓	0.20	0.22
31	Fluoranthene		14	14
32	Heptachlor	✓	0.0000079	0.0000079
33	Hexachlorobenzene	✓	0.000029	0.000029
34	Hexachlorobutadiene	✓	0.36	1.8
35	Hexachlorocyclo-hexane-Technical	✓	0.0014	0.0015
36	Hexachlorocyclopentadiene		30	110
37	Hexachloroethane	✓	0.29	0.33
38	Isophorone	✓	27	96
39	Nickel[58]		140	170
40	Nitrobenzene		14	69
41	Nitrosamines	✓	0.00079	0.046

[57] Based on June 10, 2009 updates to EPA's IRIS system, Oregon's previous q1* value of 6.1 x 10^{-3} was replaced with an RfD value of 0.01 mg/kgrams per day. EPA. *Integrated Risk Information System (IRIS).* U.S. Environmental Protection Agency, Office of Water, Washington, D.C. Available at: www.epa.gov/iris

[58] Oregon's revised human health criteria for nickel are less stringent than Oregon's previous values despite Oregon's adoption of a 175 grams per day fish consumption rate. However, the equation used to calculate the revised criteria is consistent with EPA's current 304(a) recommendations. It is unclear how ODEQ derived their previous values for nickel. Nonetheless, EPA assessed protectiveness of the revised criteria using EPA's 304(a) recommendations and Oregon's human health designated uses.

No.	Pollutant	Carcinogen	Water + Organism (µg/L)	Organism Only (µg/L)
42	Nitrosodibutylamine, N	✓	0.0050	0.02
43	Nitrosodiethylamine, N	✓	0.00079	0.046
44	Nitrosodimethylamine, N	✓	0.00068	0.30
45	Nitrosodiphenylamine, N	✓	0.55	0.60
46	Nitrosopyrrolidine, N	✓	0.016	3.4
47	Pentachlorobenzene		0.15	0.15
48	Pentachlorophenol	✓	0.15	0.30
49	Phenol[59]		9400	86000
50	Polychlorinated biphenyls (PCBs)[L]	✓	0.0000064	0.0000064
51	Selenium[60]		120	420
52	Tetrachlorobenzene 1,2,4,5-		0.11	0.11
53	Tetrachloroethane 1,1,2,2	✓	0.12	0.40
54	Tetrachloroethylene	✓	0.24	0.33
55	Thallium		0.043	0.047
56	Toluene		720	1500
57	Toxaphene	✓	0.000028	0.000028
58	Trichloroethane 1,1,2	✓	0.44	1.6
59	Trichloroethylene	✓	1.4	3.0
60	Trichlorophenol 2,4,5-		330	360
61	Trichlorophenol 2,4,6	✓	0.23	0.24
62	Vinyl chloride	✓	0.02	0.24

Footnote G: They cyanide criterion is expressed as total cyanide (CN)/L
Footnote L: This criterion applies to total PCBs (e.g. determined as Aroclors or congeners).

EPA Approval

In accordance with its Clean Water Act authority, 33 U.S.C § 1313(c)(3) and 40 C.F.R. part 131, EPA approves Oregon's revised human health toxic criteria for these 62 pollutants, consistent with EPA's current CWA § 304(a) criteria recommendations, because they are protective of fishing and water supply uses.

EPA Rationale

EPA's WQS regulations require that criteria protect the designated uses. As noted previously, Oregon's human health criteria apply to waters with fishing and water supply uses and thus must be established at a level that will protect those uses. Therefore, EPA must evaluate whether the criteria protect Oregon's human health uses.

[59] Based on updates to EPA's IRIS system, the RfD value of 6.0×10^{-1} was replaced by Oregon with an RfD value of 3.0×10^{-1}. EPA. *Integrated Risk Information System (IRIS).* U.S. Environmental Protection Agency, Office of Water, Washington, D.C. Available at: www.epa.gov/iris

[60] Oregon's revised human health criteria for selenium are less stringent than Oregon's previous values despite Oregon's adoption of a 175 grams per day fish consumption rate. However, the equation used to calculate the revised criteria is consistent with EPA's current 304(a) recommendations. It is unclear how ODEQ derived their previous values for these two pollutants. Nonetheless, EPA assessed protectiveness of the revised criteria using EPA's 304(a) recommendations and Oregon's human health designated uses.

EPA's 2000 Human Health Methodology provides guidance for deriving human health criteria for toxic pollutants. For each variable used in the criteria calculation, EPA provides a "national default value" and guidance on specific adjustments that may be necessary to reflect local conditions and/or protect identifiable subpopulations. As part of evaluating whether Oregon's criteria protect the designated uses, EPA reviewed the input values used by Oregon and whether there was Oregon-specific information relative to each value that should be considered in the review. As discussed above EPA has found that ODEQ has appropriately considered local and regional data in selecting input variables for use in deriving the criteria identified in Table 7.

EPA provides an extensive technical basis and justification as to how its recommended human health criteria adequately protect human health uses in EPA's 2000 Methodology document. Oregon's revised criteria were developed consistent with these recommendations, therefore, EPA has determined that Oregon's revised criteria protect human health uses in accordance with 40 C.F.R. Part 131.11(a)(1).

D. *METHYLMERCURY CRITERION*

1. Methylmercury: Criteria Methodology and Input Variables Used by Oregon

On January 8, 2001, EPA published[61] a new national CWA § 304(a) human health criterion recommendation for methylmercury[62] which replaced EPA's previous recommendations for total mercury. The new recommendation is expressed as a fish tissue value, thus reflecting the latest science that indicates consumption of contaminated fish and shellfish is the primary human route of exposure to methylmercury.

In 1980, EPA published a water quality criterion for total mercury. The criterion was partially updated in 1997 to incorporate a change in the reference dose (RfD). Consistent with Section 304(a) of the Clean Water Act, EPA periodically revises water quality criteria to reflect the latest scientific knowledge on the type and extent of identifiable effects on human health from the presence of pollutants in a waterbody. In 2001, EPA completed a review of the water quality criterion for protection of human health for methylmercury. This criterion recommendation considered the bioaccumulation of methylmercury as well as the latest science and data regarding health effects from intake of mercury and the primary routes of exposure. The new criterion for methylmercury was derived consistent with the *Methodology for Deriving Ambient Water Quality Criteria for the Protection of Human Health* (2000). The 2001 recommendation

[61] EPA. January 8, 2001. *Water Quality Criteria: Notice of Availability of Water Quality Criterion for the Protection of Human Health: Methylmercury*. U.S. Environmental Protection Agency, Office of Water, Washington, D.C. *Federal Register*, Volume: 66, Issue: 5, page: 1344 (66 FR 1344). Available at: http://www.epa.gov/fedrgstr/EPA-WATER/2001/January/Day-08/w217.htm
[62] EPA. January 2001. *Water Quality Criterion for the Protection of Human Health: Methylmercury*. U.S. Environmental Protection Agency, Office of Water, Washington, D.C. EPA 823-R-01-001. Available at: http://www.epa.gov/waterscience/criteria/methylmercury/document.html

is expressed as a fish tissue concentration for methylmercury and replaces the water column concentration for mercury that was contained in EPA's previous recommendation.[63]

As part of the 2001 reevaluation of the mercury criterion, EPA evaluated the sources and form of mercury that humans are exposed to when eating fish or consuming water from the nation's waters. It was found that humans are exposed primarily to methylmercury rather than to inorganic mercury and that the dominant exposure pathway is through consumption of contaminated fish and shellfish rather than from ambient water.[64] EPA found that if a criterion addressed the potential health effects from methylmercury, it would protect humans from the most toxic form of mercury and the primary route of exposure. Thus, in considering the fate of mercury in the environment and available toxicological data, EPA concluded that it is more appropriate to derive a water quality criterion for methylmercury rather than inorganic mercury. In addition, "EPA believes that the latest data and science on methylmercury exposure, effects, and environmental fate support the derivation of a fish tissue residue criterion," instead of a water column criterion.[65]

"Methylmercury is highly bioaccumulative and is the form of mercury that bioaccumulates most efficiently in the aquatic food web. Methylation of mercury is a key step in the entrance of mercury into food chains. The biotransformation of inorganic mercury species to methylated organic species in water bodies can occur in the sediment and the water column. Inorganic mercury can be absorbed by aquatic organisms but is generally taken up at a slower rate and with lower efficiency than is methylmercury."[66]

"Methylmercury continues to accumulate in fish as they age. Predatory organisms at the top of aquatic and terrestrial food webs generally have higher methylmercury concentrations because methylmercury is typically not completely eliminated by organisms and is transferred up the food chain when predators feed on prey; for example, when a largemouth bass feeds on a bluegill sunfish, which fed on aquatic insects and smaller fish, all of which could contain some amount of methylmercury that gets transferred to the predator. Nearly 100 percent of the mercury that bioaccumulates in upper trophic level fish (predator) tissue is methylmercury (Bloom, 1992; Akagi, 1995; Kim, 1995; Becker and Bigham, 1995.)"[67]

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[63] EPA. January 2001. *Water Quality Criterion for the Protection of Human Health: Methylmercury*. U.S. Environmental Protection Agency, Office of Water, Washington, D.C. EPA 823-R-01-001. page 1-1. Available at: http://www.epa.gov/waterscience/criteria/methylmercury/document.html

[64] EPA. January 8, 2001. *Water Quality Criteria: Notice of Availability of Water Quality Criterion for the Protection of Human Health: Methylmercury*. U.S. Environmental Protection Agency, Office of Water, Washington, D.C. *Federal Register*, Volume: 66, Issue: 5, Page: 1344 (66 FR 1344). page 1345. Available at: http://www.epa.gov/fedrgstr/EPA-WATER/2001/January/Day-08/w217.htm

[65] EPA. January 2001. *Water Quality Criterion for the Protection of Human Health: Methylmercury*. U.S. Environmental Protection Agency, Office of Water, Washington, D.C. EPA 823-R-01-001. page 1-2. Available at: http://www.epa.gov/waterscience/criteria/methylmercury/document.html

[66] EPA. January 8, 2001. *Water Quality Criteria: Notice of Availability of Water Quality Criterion for the Protection of Human Health: Methylmercury*. U.S. Environmental Protection Agency, Office of Water, Washington, D.C. *Federal Register*, Volume: 66, Issue: 5, Page: 1344 (66 FR 1344). page 1348. Available at: http://www.epa.gov/fedrgstr/EPA-WATER/2001/January/Day-08/w217.htm

[67] EPA. January 8, 2001. *Water Quality Criteria: Notice of Availability of Water Quality Criterion for the Protection of Human Health: Methylmercury*. U.S. Environmental Protection Agency, Office of Water,

In consideration of the environmental fate of mercury, a fish tissue residue water quality criterion was found to be appropriate for many reasons. "Such a criterion integrates spatial and temporal complexity that occurs in aquatic systems and that affects methylmercury bioaccumulation. A fish tissue residue water quality criterion is more closely tied to the CWA goal of protecting the public health because it is based directly on the dominant human exposure route for methylmercury. The concentration of methylmercury is also generally easier to quantify in fish tissue than in water and is less variable over the time periods in which water quality standards are typically implemented in water quality-based. Thus, the data used in permitting activities can be based on a more consistent and measurable endpoint. A fish tissue residue criterion is also consistent with how fish advisories are issued. Fish advisories for mercury are based on the amount of methylmercury in fish tissue that is considered acceptable, although they are usually issued for a certain fish or shellfish species in terms of a meal size. A fish tissue residue water quality criterion should enhance harmonization between these two approaches for protecting the public health."[68]

Consistent with EPA's 304(a) recommendation published in 2001, Oregon has replaced its "water + organism" and "organism only" water column human health criteria for total mercury with a new fish tissue-based "organism only" human health criterion for methylmercury. Similar to the 2000 Methodology, the computation of the methylmercury criterion uses several input variables, described in Figure C below.

Figure C: Simplified version of the equation used by Oregon in deriving its new fish tissue-based "organism only" human health criterion for methylmercury.

$$TRC = \frac{(RfD - RSC) \bullet (BW)}{(FCR)}$$

where:

TRC	=	Fish Tissue Residue Criterion (milligrams per kilogram)
RfD	=	Reference dose for noncancer effects (milligrams per kilogram per day) = 0.0001mg/kg-day
RSC	=	Relative source contribution factor to account for non-water sources of exposure (milligrams per kilogram per day) = 0
BW	=	Human body weight (kilograms) = 70 kg
FCR	=	Fish Consumption Rate (kg/day) = 175 g/day

In the 2001 methylmercury criteria document, EPA strongly encourages States and authorized Tribes to consider developing a criterion using local or regional data over the default values if they believe that appropriate for protection of the target population. EPA recommends that these

Washington, D.C. *Federal Register*, Volume: 66, Issue: 5, Page: 1344 (66 FR 1344). page 1348. Available at: http://www.epa.gov/fedrgstr/EPA-WATER/2001/January/Day-08/w217.htm

[68] EPA. January 2001. *Water Quality Criterion for the Protection of Human Health: Methylmercury*. U.S. Environmental Protection Agency, Office of Water, Washington, D.C. EPA 823-R-01-001. page xv. Available at: http://www.epa.gov/waterscience/criteria/methylmercury/document.html

adjustments be applied consistent with the guidance provided in the 2000 Human Health Methodology.[69]

Consistent with EPA's recommendation, Oregon replaced its "water + organism" and "organism only" water column human health criteria for total mercury with a new fish tissue-based "organism only" human health criterion for methylmercury equal to 0.040 micrograms per kilogram (mg/kg). In deriving this new criterion, Oregon used the equation below and the following values for each variable: reference dose equal to 0.0001 milligrams per kilogram per day; relative source contribution of 0; body weight equal to 70 kilograms and; fish consumption rate equal to 175 grams per day. As discussed in greater detail above, the reference dose and body weight are the values recommended by EPA and the fish consumption rate was derived using local and regional data. The RSC is discussed below.

a) Relative Source Contribution (RSC) for Methylmercury

Following review of available data and information specific to the exposure pathways for methylmercury, Oregon used EPA's subtraction method to derive an RSC of zero for use in deriving the human health criterion for methylmercury.[70]

In establishing a recommended RSC value, EPA found that the most significant source of exposure to methylmercury was the ingestion of marine fish. EPA also found that the estimated exposure from ambient water, drinking water, nonfish dietary foods, air, and soil were all, on average, at least several orders of magnitude less than those from marine fish ingestion. Therefore, these later exposure pathways were not factored into EPA's recommended RSC value. An RSC of 2.7×10^{-5} mg methylmercury/kg/day is recommended by EPA as an estimated exposure from marine fish intake.[71]

EPA's above recommendation is based on the assumption that the fish consumption rate does not include fish of marine origin (as would be the case for most inland states/waters and is true of EPA's national default value for fish consumptions of 17.5 grams per day). However, as part of Oregon's reevaluation of local and regional data and the selection of a fish consumption rate of 175 grams per day, Oregon did take into consideration the consumption of salmon (an anadromous species identified as marine in the CSFII study) and regional consumption rates that included estuarine finfish and shellfish. Therefore, in reviewing this information, Oregon determined that it was not necessary to provide additional protection from ingestion of marine fish through the use of an RSC value. As a result, Oregon subtracted out the exposure related to marine fish, resulting in an RSC of zero.

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[69] EPA. January 2001. *Water Quality Criterion for the Protection of Human Health: Methylmercury*. U.S. Environmental Protection Agency, Office of Water, Washington, D.C. EPA 823-R-01-001, page 7-2. Available at: http://www.epa.gov/waterscience/criteria/methylmercury/document.html

[70] November 3, 2000. *Federal Register*, Volume: 65, Issue: 214, pages: 66472-3 (65 FR 66472-3). Available at: http://www.epa.gov/fedrgstr/EPA-WATER/2000/November/Day-03/w27924.htm

[71] EPA. January 2001. *Water Quality Criterion for the Protection of Human Health: Methylmercury*. U.S. Environmental Protection Agency, Office of Water, Washington, D.C. EPA 823-R-01-001. page xiv. Available at: http://www.epa.gov/waterscience/criteria/methylmercury/document.html

EPA's 2000 Human Health Methodology recognizes that if States include marine fish in the fish consumption rate they may need to adjust the RSC consistent with this decision to appropriately represent overall exposure to a pollutant.

"States and Tribes need to ensure that when evaluating overall exposure to a contaminant, [and that] marine fish intake is not double-counted with the other dietary intake estimate used. Coastal States and authorized Tribes that believe accounting for total fish consumption (i.e., fresh/estuarine and marine species) is more appropriate for protecting the population of concern may do so, provided that the marine intake component is not double-counted with the RSC estimate." [72]

Oregon's use of the subtraction method for deriving the RSC for methylmercury is consistent with this guidance.

2. New human health criteria for methylmercury

Oregon has adopted the following new criterion for methylmercury:

Table 8: Oregon's criterion for methylmercury.

Pollutant	Carcinogen	Water + Organism (µg/L)	Organism Only (µg/L)
Methylmercury (mg/kg)[J]		--	0.040 (mg/kg)

Footnote J: This value is expressed as the fish tissue concentration of methylmercury. Contaminated fish and shellfish is the primary human route of exposure to methylmercury.

Oregon's new criterion of 0.040 mg/kg is expressed as a fish tissue residue concentration, not a water column concentration as all other human health criteria adopted by Oregon. Thus, when applying the criterion, ODEQ may need to consider data collected from either the water column or fish tissue or express a limitation as a water column value (e.g. provide a discharger with an effluent limit in an NPDES permit that can be measured in their effluent). Recognizing this fact, EPA has encouraged "states and authorized tribes to develop a methylmercury criterion implementation plan to ensure environmentally protective and effective administration of all water quality related programs with respect to methylmercury". Furthermore, to assist the States in this process, in April 2010 EPA published recommended methods for implementing these criteria. [73] In recognition of this need, Oregon's Human Health Criteria Issue Paper states that "…DEQ intends to develop implementation procedures similar to EPA's *Guidance for Implementing the January 2001 Methylmercury Criterion.*"[74]

[72] EPA. 2000. *Methodology for Deriving Ambient Water Quality Criteria for the Protection of Human Health*. EPA-822-B-00-004. page 4-25. Available at: http://www.epa.gov/waterscience/criteria/humanhealth/method/complete.pdf
[73] EPA. January 2001. *Water Quality Criterion for the Protection of Human Health: Methylmercury*. U.S. Environmental Protection Agency, Office of Water, Washington, D.C. EPA 823-R-01-001. pages 21-22. Available at: http://www.epa.gov/waterscience/criteria/methylmercury/document.html
[74] ODEQ. May 24, 2011. *Human Health Criteria Issue Paper*. Oregon Department of Environmental Quality. page 26. Available at: http://www.deq.state.or.us/wq/standards/docs/toxics/humanhealth/rulemaking/HumanHealthToxicCriteriaIssuePaper.pdf

3. EPA Action and Rationale Regarding Oregon's Methylmercury Criterion

EPA Action
In accordance with its Clean Water Act authority, 33 U.S.C § 1313(c)(3) and 40 C.F.R. part 131, EPA approves Oregon's new human health criterion for methylmercury, consistent with EPA's current CWA § 304(a) criteria recommendations, because it is protective of Oregon's fishing and water supply uses. EPA is also approving the first sentence of footnote J which states: *This value is expressed as the fish tissue concentration of methylmercury.*

EPA Rationale
EPA's WQS regulations require that criteria protect the designated uses. As noted previously, Oregon's human health criteria apply to waters with fishing and water supply uses and thus must be established at a level that will protect those uses. Therefore, EPA must evaluate whether the criteria protect Oregon's human health uses.

EPA's 2000 Human Health Methodology and 2001 Criteria Recommendations for Methylmercury provide guidance for deriving human health criteria for methylmercury. For each variable used in the criteria calculation, EPA provides a "national default value" and guidance on specific adjustments that may be necessary to reflect local conditions and/or protect identifiable subpopulations. As part of evaluating whether Oregon's criteria protect the designated uses, EPA reviewed the input values used by Oregon and whether there was Oregon-specific information relative to each value that should be considered in the review.

For all input variables except for the fish consumption rate and the RSC value, Oregon used EPA's recommended 304(a) national default values for calculating the methylmercury criterion. EPA has not identified any local or regional data to indicate that the national values for the reference dose, body weight, or drinking water intake rate are inappropriate for use in Oregon.

Oregon has used local and regional data to develop the fish consumption rate and RSC values used to calculate the methylmercury criterion. EPA has reviewed the information used in developing these values and has found that ODEQ appropriately considered the available data and developed input values consistent with EPA guidance.

EPA's 2001 Methylmercury Criteria document provides an extensive technical basis and justification as to how EPA's recommended criterion adequately protects human health uses. Based on Oregon's consistency with EPA's recommendations in the 2001 Methylmercury Criteria document and as discussed above, EPA has determined that Oregon's new methylmercury criterion protects human health uses in accordance with 40 C.F.R. Part 131.11(a)(1).

In addition, EPA is approving the first sentence of footnote J which states: *This value is expressed as the fish tissue concentration of methylmercury.* This sentence of the footnote provides clarification that the human health criterion for methylmercury is expressed as a fish tissue concentration rather than as a water column concentration. Oregon's new footnote

language along with the human health criterion value for methylmercury are consistent with EPA's recommended 304(a) national default values for calculating the criterion. This sentence of the footnote establishes a legally binding requirement under state law and helps describe a desired ambient condition of a waterbody to support a particular designated use and is therefore considered a WQS subject to EPA review and approval under 303(c) of the CWA. The description of the applicable expression of methylmercury is a component of the overall level of protection afforded by the criterion. Since this sentence of the footnote specifies the applicable expression of the methylmercury criterion Oregon adopted, EPA has approved this sentence of the footnote as a WQS.

EPA acknowledges the second sentence of footnote J which states: *Contaminated fish and shellfish is the primary human route of exposure to methylmercury.* This sentence of the footnote provides details on the primary route of human exposure to methylmercury, but does not establish a legally binding requirement under State law and it does not describe a desired ambient condition of a waterbody to support a particulate designated use. For this reason, this sentence of footnote J is not considered a WQS subject to EPA review and approval under 303(c) of the CWA. As a result, EPA is taking no action to approve or disapprove the second sentence of footnote J for methylmercury.

E. *INORGANIC ARSENIC CRITERIA*

1. Background

The Oregon Environmental Quality Commission directed ODEQ to revise Oregon's human health criteria for toxic pollutants based on an increased fish consumption rate of 175 grams per day as well as to carefully consider cost effective and environmentally meaningful implementation of the criteria and review the data and science behind the criteria for earth metals.[75] ODEQ reviewed the science supporting the EPA's recommended 304(a) arsenic criteria and considered the appropriateness of revising the criteria to more closely reflect the levels of arsenic that naturally occur in Oregon waters. Oregon's revised arsenic criteria, submitted to EPA on July 12, 2011 are the result of that review. Oregon's goal in reevaluating the criteria was to protect human health, reduce toxic pollutants and to achieve meaningful environmental results commensurate with the cost.[76]

Oregon made the following arsenic-related regulatory revisions (including some changes other than revisions to arsenic criteria):

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[75] Oregon Environmental Quality Commission (OEQC). October 23, 2008. *Oregon Environmental Quality Commission Minutes of the Three Hundred and Forty-sixth Meeting.* Available at: http://www.deq.state.or.us/about/eqc/minutes/2008/2008octEQCMinutes.htm

[76] ODEQ. April 5, 2011. *Memo from Dick Pedersen, Director ODEQ, to the Environmental Quality Commission. Agenda Item E. Rule adoption: Amending water quality standards for arsenic, April 21-22, 2011EQC meeting.* Oregon Department of Environmental Quality. pages 1-2. Available at: http://www.deq.state.or.us/wq/standards/docs/toxics/metals/EQCItemEStaffReport.pdf

- Revised the numeric criteria human health criteria for arsenic in OAR 340-04-0033 Table 20.
- Identified the form of arsenic addressed by the criteria as inorganic arsenic.
- Added footnote A which states "The arsenic criteria are expressed as total inorganic arsenic. The 'organism only' criteria are based on a risk level of approximately 1.1 x 10^{-5}, and the 'water + organism' criterion is based on a risk level of 1.1 x 10^{-4}."[77]
- Revised the drinking water M.C.L. from 0.05 mg to 10 µg/l in Table 20 and added footnote 1 which states "The arsenic value is shown here for informational purposes only and is not a water quality criterion."
- Added a new provision, OAR 340-04-0033(2)(b), that states the arsenic criteria become effective for purposes of State law and the CWA at the time of EPA approval.[78]
- Added an arsenic reduction policy under State law to address the reduction of arsenic from some anthropogenic sources in the vicinity of public drinking water intake supplies.[79]

The revised arsenic criteria were adopted through a public notice and rulemaking action separate from that used to adopt the June 16, 2011 human health criteria revisions. This separate rulemaking process is described in Section III above.

ODEQ reviewed the available scientific literature on bioaccumulation of arsenic and the ratio of inorganic arsenic to total arsenic in freshwater and marine environments. ODEQ also reviewed data specific to waters in Oregon and used the information to derive arsenic criteria for Oregon's waters.

Arsenic is a known carcinogen that may cause cancer in skin or internal organs such as the liver, kidneys, lungs and bladder. Other potential health impacts from arsenic include cardiovascular, kidney, central nervous system and hyper-pigmentation or keratosis effects.[80] In its 304(a) criteria recommendations EPA states that arsenic criteria should be based on cancer endpoints and be applied as inorganic arsenic.

Naturally-occurring arsenic in Oregon comes from geologic sources. It is typically present at natural levels in fresh surface waters at background levels that range from less than 1 microgram per liter (µg/l) to 3 µg/l. ODEQ data indicate that much higher arsenic levels (greater than 5-10 µg/l) may be present in some south central and southeastern Oregon watersheds but it is not known whether these levels represent solely natural geologic sources or are elevated due to

[77] Footnote A for arsenic was established in Table 40 in ODEQ's July 21, 2011 submittal to EPA.
[78] This language was deleted as part of ODEQ's July 21, 2011 submittal to EPA since effective dates of the criteria are addressed in OAR 340-041-0033(1), which includes arsenic.
[79] To accommodate additional revisions associated with ODEQ's submittal to EPA on July 21, 2011 ODEQ moved the location of this rule from OAR 340-041-0033(4) to OAR 340-041-0033(7). However, the rule language was not revised.
[80] EPA. 2000. *Methodology for Deriving Ambient Water Quality Criteria for the Protection of Human Health*. U.S. Environmental Protection Agency, Office of Water, Washington, D.C. EPA-822-B-00-004. page 2-6. Available at: http://www.epa.gov/waterscience/criteria/humanhealth/method/complete.pdf

anthropogenic activity.[81] ODEQ's review of the scientific literature indicates natural total arsenic levels of the oceans to be in the range of 1 to 3 µg/l.[82]

EPA's current 304(a) human health criteria recommendations for arsenic, published in 1986, are derived using a fish consumption rate of 6.5 grams per day and a cancer slope factor of 1.75 and are recommended to be applied as inorganic arsenic.[83] As is the case for all pollutants, EPA's 2000 Human Health Methodology encourages states to use local and regional data when making risk management decisions inherent in developing criteria, including decisions inherent in selecting the appropriate fish consumption rate, target risk level and bioaccumulation factor.[84]

2. Numeric Criteria Revisions

Based on its review of current data and information, ODEQ found differences in the bioconcentration (BCF) of arsenic in freshwater and saltwater organisms. In addition, DEQ found the ratio of inorganic arsenic relative to total arsenic differs in the freshwater and marine environments. Based on these findings, Oregon adopted two sets of criteria, one applying to freshwater and the other to saltwater. The revised criteria and the input variables used to calculate the criteria are presented in Tables 9 and 10 below.

Oregon has adopted the following new criterion for inorganic arsenic:

Table 9: Oregon's revised arsenic criteria (as inorganic arsenic).

Pollutant	Carcinogen	Water + Organism (µg/L)	Organism Only (µg/L)
Arsenic (inorganic)[A]	✓	2.1	2.1 (freshwater) 1.0 (saltwater)

Footnote A: The arsenic criteria are expressed as total inorganic arsenic. The "organism only" criteria are based on a risk level of approximately 1.1 x 10^{-5}, and the "water + organism" criterion is based on a risk level of 1.1 x 10^{-4}.

Table 10. Input variables for Oregon's revised arsenic criteria.

	Water + organism: freshwater	Organism only: freshwater	Organism only: saltwater
Revised Criteria	2.1 µg/l	2.1 µg/l	1.0 µg/l
Input Variables	FCR=175	FCR=175	FCR=175

[81] ODEQ. April 4, 2011. *Issue Paper: Water Quality Standards Review and Recommendations: Arsenic.* Oregon Department of Environmental Quality. page 6. Available at: http://www.deq.state.or.us/wq/standards/docs/toxics/metals/AppEArsenicIssuePaper.pdf
[82] ODEQ. April 4, 2011. *Issue Paper: Water Quality Standards Review and Recommendations: Arsenic.* Oregon Department of Environmental Quality. page 14. Available at: http://www.deq.state.or.us/wq/standards/docs/toxics/metals/AppEArsenicIssuePaper.pdf
[83] EPA. May 1, 1986. *Quality Criteria for Water.* U.S. Environmental Protection Agency, Office of Water. 440/5-86-001. At: https://owpubauthor.epa.gov/scitech/swguidance/standards/upload/2009_01_13_criteria_goldbook.pdf
[84] EPA. 2000. *Methodology for Deriving Ambient Water Quality Criteria for the Protection of Human Health.* U.S. Environmental Protection Agency, Office of Water, Washington, D.C. EPA-822-B-00-004. page 2-6. Available at: http://www.epa.gov/waterscience/criteria/humanhealth/method/complete.pdf

	BCF=14 IF=10% CSF=1.5 Risk level=$1x10^{-4}$	BCF=14 IF=10% CSF=1.5 Risk level=$1.1x10^{-5}$	BCF=26 IF=10% CSF=1.5 Risk level=$1x10^{-5}$

FCR = Fish Consumption Rate IF = Inorganic Factor
BCF = Bioconcentration Factor CSF = Cancer Slope Factor

Oregon's arsenic criteria revisions were adopted into Table 20 (Water Quality Criteria Summary), OAR 340-04-0033. It should be noted that in Oregon's June 16, 2011 action, all human health criteria in Table 20 were moved to Table 40. Thus, the arsenic criteria are now located in Table 40.

Oregon's revised numeric criteria for arsenic were derived using the same general methodology and equation used to calculate EPA's current 304(a) criteria for carcinogens. However, based on its review of scientific studies and Oregon specific data,[85] Oregon applied an inorganic to total arsenic ratio in the criteria calculation because the arsenic criteria are expressed in terms of inorganic arsenic, but the toxicity data used to develop EPA's BCF are reported in the form of total arsenic. Therefore, Oregon applied the inorganic to organic arsenic ratio to the criteria calculated using BCF values they derived based on state-specific data. Oregon also applied a fish consumption rate based on state-specific data. Oregon used the cancer slope factor listed in EPA's IRIS database available at the time of criteria adoption (April 2011). The input variables used by Oregon to derive their revised criteria are listed in Table 10 above.

a) Freshwater Criteria

Body weight and drinking water intake rate
Oregon used EPA's recommended national default rates for body weight and drinking water intake rates. These are the same values that Oregon used to derive all other criteria addressed in this action. Further detail on these variables was provided above.

Fish consumption rate
A fish consumption rate of 175 grams per day was used to derive the freshwater arsenic criteria. This is the same fish consumption rate that Oregon used to derive all other criteria addressed in this action. As discussed in detail above, this rate was determined by ODEQ to be appropriate for use in Oregon's human health criteria following a thorough review of local and regional data.

The fish consumption rate of 175 grams per day was selected by Oregon to ensure protection of all people in Oregon who may consume fish and shellfish from state waters including those who traditionally consume large amounts of fish for subsistence, health, economic or other reasons.[86] It reflects the 95th percentile of tribal members surveyed as part of the CRITFC Survey and the

[85] For more detail, see previous description in this document of methodology for deriving criteria for carcinogens.
[86] ODEQ. October 6, 2008. *Memo from Dick Pederson, Director ODEQ, to the Environmental Quality Commission. Agenda Item G, Action Item: Oregon's Fish Consumption Rate – For Use in Setting Water Quality Standards for Toxic Pollutants October 23, 2008 EQC Meeting.* Oregon Department of Environmental Quality. page 7. Available at: http://www.deq.state.or.us/about/eqc/agendas/attachments/2008oct/ItemG.pdf

90th percentile of subsistence consumers surveyed in regional fish consumption studies. The Human Health Focus Group formed by ODEQ to provide technical recommendations for selecting a fish consumption rate appropriate for Oregon found that fish consumers generally eat a variety of species that are the most readily available geographically and seasonally and that the range of consumption rates among fish consumers tend to be comparable regardless of the species that are available at any given time.[87] Thus, Oregon determined the rate of 175 grams per day appropriate for protection of high consumers from both freshwater and saltwater environments throughout the state.

Bioconcentration factor

Limited data are available regarding bioaccumulation (BAF) and bioconcentration (BCF) of arsenic in aquatic species. As discussed above, EPA recommends bioaccumulation data be used when available in order to take into consideration all pathways of accumulation, not merely the concentration that is received from water as reflected in bioconcentration data. EPA review of the literature found no relevant BAF data was available and thus EPA recommended that BCF data be used by Oregon to determine appropriate BCFs for use in deriving their arsenic criteria.[88]

EPA reviewed the available literature that might be relevant to recalculating a BCF specific to Oregon's waters and provided that information to ODEQ.[89] Only six published studies were identified and only four of the studies were found suitable for use in recalculating a BCF. Limitations in the data reported in two of the studies resulted in EPA determining they were not appropriate for use and thus were not used in either ODEQ's recalculations or EPA's review of the recalculated BCFs. The four studies found to be appropriate for this purpose and thus used provided data for only three species. One data set is from a test of a saltwater mollusk, the eastern oyster, and the others tested two freshwater finfish, bluegill and rainbow trout. Additional information on these studies can be found in ODEQ's April 2011 review document.[90]

Oregon determined that a BCF of 14 was appropriate for use in developing arsenic human health criteria for freshwaters of the state based on their review of the data contained in the above mentioned studies. A BCF of 14 represents the geometric mean of the data available from the studies of freshwater organisms (two publications on rainbow trout[91] and one on bluegill[92]). Oregon determined that the BCF data for the eastern oyster, a marine mollusk, was not appropriate for use in deriving a freshwater BCF because the oyster was a marine organism and available data indicate marine organisms are more likely to bioaccumulate arsenic than freshwater organisms. Furthermore, DEQ stated that they were not aware of data showing

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[87] ODEQ. June 2008. *Human Health Focus Group Report. Oregon Fish and Shellfish Consumption Rate Project.* Oregon Department of Environmental Quality. pages 18-19. Available at: http://www.deq.state.or.us/wq/standards/docs/toxics/HHFGFinalReportJune2008.pdf
[88] EPA. November 2011. Oregon Arsenic BCF and 304(a) Calculations.
[89] EPA. November 2011. Oregon Arsenic BCF and 304(a) Calculations.
[90] ODEQ. April 4, 2011. *Issue Paper: Water Quality Standards Review and Recommendations: Arsenic.* Oregon Department of Environmental Quality. Available at: http://www.deq.state.or.us/wq/standards/docs/toxics/metals/AppEArsenicIssuePaper.pdf
[91] McGeachy and Dixon, 1990. Canadian Journal of Fisheries and Aquatic Sciences. 47: 2228-2233; Rankin and Dixon, 1994. Canadian Journal of Fisheries and Aquatic Sciences. 51: 372-380.
[92] Barrows, et al. 1980. Ann Arbor Science Pub., Inc., Ann Arbor, MI. pages 379-392.

harvesting or consumption of mollusks or other shellfish from freshwaters in Oregon and thus, freshwater mollusks were not likely to comprise a significant portion of the fish consumed from freshwaters in Oregon. Thus Oregon assumed finfish would be the primary exposure route for arsenic ingested from freshwaters and therefore, used only the data from finfish studies to calculate the freshwater BCF.[93,94] Based on this evaluation, ODEQ found that a BCF of 14 was a reasonable and protective value to use in calculating the arsenic criteria for Oregon's freshwaters.

Cancer Slope Factor

Similar to all other criteria addressed in this action, for arsenic, ODEQ used the cancer slope factor identified in EPA's Integrated Risk Information System (IRIS) data base at the time of rule adoption (April 2011). For arsenic this value is 1.5 $(mg/kg/day)^{-1}$ and was last modified in 1998.

Inorganic Proportion Factor (Inorganic to Total Arsenic Ratio)

Arsenic is present in the environment and in fish tissue in both organic and inorganic forms. Inorganic arsenic, specifically arsenite (trivalent or As III), is the form that is most toxic to humans and used to develop toxicity data for cancer and other end points. Thus, EPA recommends that human health criteria for arsenic are developed specific to inorganic arsenic and apply to the inorganic portion of arsenic in the water column. The inorganic portion may be referred to as either "inorganic arsenic" or "total inorganic arsenic". When both inorganic and organic arsenic are included, it is referred to as "total arsenic".[95]

All of the bioconcentration studies identified by EPA and used by Oregon reported arsenic as total arsenic, not inorganic arsenic. In order to address this difference in form and toxicity, Oregon multiplied the BCF by an "inorganic proportion factor" that reflects the ratio of inorganic to total arsenic likely to be present in the water. The proportion varies geographically and between fresh and marine waters so must be determined using state or local data.

Only limited data are available relative to the ratio of inorganic to total arsenic in Oregon's freshwaters. Previous studies have reported the proportion of inorganic arsenic found in fish tissue collected in the Columbia and Willamette rivers to contain an average of 6.5% inorganic arsenic while the ratios reported for individual species of fish ranged from 0.5% to 9.2% inorganic arsenic.[96] ODEQ also found several other sources of information indicating that an

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[93] ODEQ. April 4, 2011. *Issue Paper: Water Quality Standards Review and Recommendations: Arsenic.* Oregon Department of Environmental Quality. pages 12-13. Available at: http://www.deq.state.or.us/wq/standards/docs/toxics/metals/AppEArsenicIssuePaper.pdf
ODEQ. March 2011. *Summary of Public Comment and Agency Response. Amending Oregon's Water Quality Standards: Revising Human Health Criteria for Arsenic.* Oregon Department of Environmental Quality. pages 16-17. Available at: http://www.deq.state.or.us/wq/standards/docs/toxics/metals/AttCArsenicPublicComment.pdf
[94] EPA's review of this decision is documented later in this subsection.
[95] EPA. 2009. *EPA National Recommended Water Quality Criteria.* U.S. Environmental Protection Agency Office of Water. Office of Science and Technology. Available at: http://water.epa.gov/scitech/swguidance/standards/current/upload/nrwqc-2009.pdf
[96] ODEQ. April 4, 2011. *Issue Paper: Water Quality Standards Review and Recommendations: Arsenic.* Oregon Department of Environmental Quality. page 13. Available at: http://www.deq.state.or.us/wq/standards/docs/toxics/metals/AppEArsenicIssuePaper.pdf

inorganic proportion of 10% or less was typical of freshwater environments.[97] Based on these findings, Oregon determined that an inorganic factor of 10% was a conservative ratio and appropriate for use in deriving the arsenic criteria for Oregon's freshwaters.

To incorporate the inorganic factor (IF) into the calculation, ODEQ used the following revised equations:

$$\text{Water + fish ingestion Criterion } (\mu g/L) = 1000 \times \frac{RF \times BW}{q1^*[DW + (BCF \times FCR \times \mathbf{IF})]}$$

$$\text{Org Only Criterion } (\mu g/L) = 1000 \times \frac{RF \times BW}{q1^*[BCF \times FCR \times \mathbf{IF}]}$$

Carcinogenic Risk Level

In the 2000 Human Health Methodology EPA states that it believes States and authorized Tribes have the flexibility to adopt the carcinogenic risk level they find appropriate for protection of the designated uses as long as the general population is protected at a 10^{-5} or 10^{-6} risk level and highly exposed populations are protected at a risk level that does not exceed 10^{-4}.[98] With the exception of arsenic, Oregon has used a risk rate of 10^{-6} when developing water quality criteria for carcinogenic pollutants. However, due to the natural levels of arsenic in Oregon's waters and the exposure levels resulting from natural sources of arsenic, Oregon has chosen to use a risk level of 10^{-4} for the arsenic criteria. Oregon made this policy decision following consideration of several alternatives and consideration of public comments received on the proposed criteria. The lower level of protection afforded by the proposed criteria was clearly identified by ODEQ in the documents provided to the public during both public notice periods and in the materials presented to the EQC at the time the rule was adopted.[99] ODEQ has stated that they made this

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EPA. 2002. *Columbia River Basin Fish Contaminant Survey, 1996-1998*. U.S. Environmental Protection Agency, Region 10, Seattle, Washington. EPA 910-R-02-006. Available at: http://yosemite.epa.gov/r10/oea.nsf/0703bc6b0c5525b088256bdc0076fc44/c3a9164ed269353788256c09005d36b7/$FILE/Fish%20Study.PDF

EVS Environmental Consultants. November 21, 2000. *Human Health Risk Assessment of Chemical Contaminants in Four Fish Species from the Middle Willamette River, Oregon*. Prepared for the Oregon Department of Environmental Quality, Portland, Oregon. Available at: http://www.deq.state.or.us/wq/willamette/docs/studies/hhrarpt.pdf

[97]ODEQ. April 4, 2011. *Issue Paper: Water Quality Standards Review and Recommendations: Arsenic.* Oregon Department of Environmental Quality. page 13. Available at: http://www.deq.state.or.us/wq/standards/docs/toxics/metals/AppEArsenicIssuePaper.pdf

[98] EPA. 2000. *Methodology for Deriving Ambient Water Quality Criteria for the Protection of Human Health*. U.S. Environmental Protection Agency, Office of Water, Washington, D.C. EPA-822-B-00-004. page 2-6. Available at: http://www.epa.gov/waterscience/criteria/humanhealth/method/complete.pdf

[99] ODEQ. April 4, 2011. *Issue Paper: Water Quality Standards Review and Recommendations: Arsenic.* Oregon Department of Environmental Quality. Available at: http://www.deq.state.or.us/wq/standards/docs/toxics/metals/AppEArsenicIssuePaper.pdf

ODEQ. April 5, 2011. *Memo from Dick Pedersen, Director ODEQ, to the Environmental Quality Commission. Agenda Item E. Rule adoption: Amending water quality standards for arsenic, April 21-22, 2011EQC meeting.* Oregon Department of Environmental Quality. pages 1-2. Available at: http://www.deq.state.or.us/wq/standards/docs/toxics/metals/EQCItemEStaffReport.pdf

decision because of the special circumstances associated with natural levels of arsenic but believed that the 10^{-6} risk level used to derive all other criteria continued to be appropriate.[100] In determining the acceptable risk level for the arsenic criteria, ODEQ considered the natural background levels of arsenic commonly found in Oregon and evaluated the likely risk associated with exposure to these levels for the general population and high fish consumers. As noted earlier, ODEQ found that naturally occurring arsenic in many surface waters of the state range from less than 1 µg/l up to 3 µg/l and may occur at much higher levels. Therefore, ODEQ evaluated the risks that would be associated with arsenic criteria of 2-3 µg/l.

Using the input variables identified above, Oregon determined that a freshwater water plus organism (water + org) criterion of 2.1µg/l would result in a carcinogenic risk of $1x10^{-4}$. Since this value would protect high fish consumers of the State (those consuming 175 grams of fish per day) at a 10^{-4} risk level, Oregon found this criterion would protect the human health uses in State waters at a level consistent with the risk levels recommended by EPA in the 2000 Human Health Methodology.[101] Thus, Oregon adopted an arsenic water plus organism criterion of 2.1 µg/l for freshwaters.

Oregon similarly evaluated the criterion for protection of waters where fish consumption was a designated use but drinking water was not a designated use (organism (org) only criterion). Using the same variables discussed above, Oregon determined that a criterion of 19 µg/l would protect at a $1x10^{-4}$ risk level while a criterion value of 1.9 µg/l would protect at a $1x10^{-5}$ risk level. Oregon noted that establishing the org only criterion at the same risk level as the water + org criterion would result in a criterion that was nearly an order of magnitude less stringent than the water + org criterion. Therefore, after reviewing several options Oregon established the organism only criterion at the same level as the water + org criterion (2.1 µg/l). Oregon's revised freshwater arsenic org only criterion of 2.1 µg/l represents a carcinogenic risk of 1.1 x 10^{-5} to high consumers of the State (at a fish consumption rate of 175 grams/day). Oregon found this level of protection appropriate as it was within the risk range identified in EPA's 2000 Human Health Methodology and took into consideration the natural levels of arsenic found in Oregon's waters.[102]

ODEQ. April 21, 2011. Recommended Revisions to Oregon's Human Health Criteria for Arsenic, Presentation to the EQC. See Action Item E audio presentation. Available at: http://www.deq.state.or.us/about/eqc/minutes/2011/2011aprEQCMinutes.htm

[100] ODEQ. March 2011. *Summary of Public Comment and Agency Response. Amending Oregon's Water Quality Standards: Revising Human Health Criteria for Arsenic.* Oregon Department of Environmental Quality. page 25. Available at: http://www.deq.state.or.us/wq/standards/docs/toxics/metals/AttCArsenicPublicComment.pdf
ODEQ. April 4, 2011. *Issue Paper: Water Quality Standards Review and Recommendations: Arsenic.* Oregon Department of Environmental Quality. pages 10-11. Available at: http://www.deq.state.or.us/wq/standards/docs/toxics/metals/AppEArsenicIssuePaper.pdf
ODEQ. April 5, 2011. *Memo from Dick Pedersen, Director ODEQ, to the Environmental Quality Commission. Agenda Item E. Rule adoption: Amending water quality standards for arsenic, April 21-22, 2011EQC meeting.* Oregon Department of Environmental Quality. pages 4-5. Available at: http://www.deq.state.or.us/wq/standards/docs/toxics/metals/EQCItemEStaffReport.pdf

[101] ODEQ. April 5, 2011. *Memo from Dick Pedersen, Director ODEQ, to the Environmental Quality Commission. Agenda Item E. Rule adoption: Amending water quality standards for arsenic, April 21-22, 2011EQC meeting.* Oregon Department of Environmental Quality. Available at: http://www.deq.state.or.us/wq/standards/docs/toxics/metals/EQCItemEStaffReport.pdf

[102] ODEQ. April 4, 2011. *Issue Paper: Water Quality Standards Review and Recommendations: Arsenic.* Oregon

b) Saltwater Criteria

Oregon's objectives in developing an arsenic criterion for saltwater was to protect those who consume fish and shellfish from Oregon's marine and estuarine waters to which a criterion applies, taking into consideration the presence of naturally occurring levels of arsenic in marine waters. Uncertainties in the scientific community's current knowledge of the various species of arsenic in the saltwater environment and in marine and estuarine species also were considered in the evaluation.[103]

Oregon has not designated any saltwaters of the state as a drinking water use. Consistent with this designation, the only human health criterion applicable to and derived for saltwaters in Oregon are the organism only criteria (i.e. developed to protect humans from health effects incurred while ingesting fish and shellfish). As identified in Table 9 above, Oregon adopted an organism only criterion of 1.0 µg/l inorganic arsenic for all saltwaters of the State. The following discusses the input variables used and the conclusions reached by ODEQ in establishing this criterion.

Body weight, fish consumption rate and cancer slope factor
The input variables used for body weight, fish consumption rate and the cancer slope factor to derive Oregon's arsenic human health water quality criteria applicable to saltwater are the same as those used to derive the freshwater criteria discussed above.

Bioconcentration factor and inorganic proportion factor
Oregon's arsenic criterion for saltwater was calculated using a BCF of 26 (the geometric mean of all BCFs for fresh and saltwater species combined) and an inorganic proportion factor of 10%.

As discussed in the freshwater section above, bioconcentration data for arsenic is limited. EPA's review of the literature found only four studies appropriate for use in calculating BCFs and only one of those tested an organism from a saltwater environment (eastern oyster).[104] When ODEQ reviewed the available studies, they found a large difference in BCF values found in the study of the Eastern oyster (BCF of 350) relative to those found in the freshwater finfish studies (BCFs of 4 to 27). Given the differences in the BCFs and recognizing that people consume both mollusks and finfish from the Oregon waters where this criterion would apply, ODEQ evaluated potential options for criteria using two scenarios (see Table 11 below). The first scenario considered criterion calculated using a BCF of 26, the geometric mean of all available BCF data (both saltwater and freshwater). The second evaluated options using a BCF of 350, the geometric mean from the one study of a saltwater organism. Under both scenarios, the criteria that would result from using inorganic proportion factors of 1% and 10% were calculated. Results of the various options were compared to levels of arsenic naturally present in estuarine and marine

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Department of Environmental Quality. page 14. Available at:
http://www.deq.state.or.us/wq/standards/docs/toxics/metals/AppEArsenicIssuePaper.pdf

[103] ODEQ. April 4, 2011. *Issue Paper: Water Quality Standards Review and Recommendations: Arsenic.* Oregon Department of Environmental Quality. page 14. Available at:
http://www.deq.state.or.us/wq/standards/docs/toxics/metals/AppEArsenicIssuePaper.pdf

[104] Zaroogian and Hoffman. 1982. *Arsenic uptake and loss in the American oyster, Crassostrea virinica.* Environmental Monitoring and Assessment 1:345-358.

waters. Following analysis of the options generated under the two scenarios ODEQ evaluated the level of protection provided by each and compared the criteria to the concentrations of arsenic naturally present in estuarine and marine waters. Based on this analysis ODEQ determined that a criterion of 1.0 µg/L inorganic arsenic was appropriate for protection of the fish consumption use in Oregon's saltwaters.

Table 11. Scenarios evaluated by Oregon and/or EPA.

Scenario	A	B	C	D	E	F
Fish Consumption	175 g/day	175 g/day	175 g/day	175 g/day	175 g/day	
Bioconcentration	26	26	350	350	350	
Inorganic portion	10%	1%	1%	10%	7.3%	
Risk level	1×10^{-5}	1×10^{-6}	1×10^{-5}	1.3×10^{-5}	9.6×10^{-5}	
Natural ocean level						1 – 1.2 µg/l
Resultant Criterion	**1.0 µg/l**	**1.0 µg/l**	**0.8 µg/l**	**1.0 µg/l**	**1.0 µg/l**	**1.0 µg/l**

As part of this evaluation, ODEQ evaluated the appropriate species to be considered in deriving a BCF value, the ratio of inorganic to total arsenic in the ocean environment, and the natural level of arsenic in Oregon's salt waters. When evaluating BCF data, ODEQ found that bioconcentration of arsenic in the tissue of invertebrates tended to be higher than that for vertebrates. In particular, they found that crustaceans and mollusks tended to accumulate more inorganic arsenic in their tissue (the form toxic to humans) than anadromous or marine fish. While data specific to consumption levels of various species from Oregon's saltwaters was not available, ODEQ knew that both shellfish and finfish were harvested and consumed from saltwaters in Oregon. ODEQ's literature review also indicated that, for the general US population, estuarine and marine mollusks represent only a small percent (3-13%) of the total fish and shellfish consumption. Given the small percentage of shellfish consumption relative to fish consumption and the much higher bioconcentration rate in shellfish, ODEQ concluded that a criterion calculated using only the oyster data (BCF = 350) was likely to be overly conservative.[105]

Oregon's literature review found a growing body of literature indicating that while saltwater organisms may contain more total arsenic than freshwater fish, the predominant form of arsenic in marine species is organic arsenic (i.e. rather than inorganic arsenic).[106] One analysis of five types of ocean finfish and ocean shrimp found that inorganic arsenic in the organism's tissues was less than 0.1% of the total arsenic present in tissues.[107] Other literature reported values of less than 3% and more recent surveys report values less than 1%.[108] A summary of the data from

[105] ODEQ. April 4, 2011. *Issue Paper: Water Quality Standards Review and Recommendations: Arsenic.* Oregon Department of Environmental Quality. pages 15-16. Available at: http://www.deq.state.or.us/wq/standards/docs/toxics/metals/AppEArsenicIssuePaper.pdf

[106] ODEQ. April 4, 2011. *Issue Paper: Water Quality Standards Review and Recommendations: Arsenic.* Oregon Department of Environmental Quality. pages 16-17 in EPA 2003; Neff 1997; Schoof and Yager 2007; Tanaka and Santosa 1995; TetraTech 1996, IN EPA 2002; and Williams et.al. 2006. Available at: http://www.deq.state.or.us/wq/standards/docs/toxics/metals/AppEArsenicIssuePaper.pdf

[107] ODEQ. April 4, 2011. *Issue Paper: Water Quality Standards Review and Recommendations: Arsenic.* Oregon Department of Environmental Quality. pages 16-17 in Schoof et. al., 1999 in BorakandHosgood. 2007. Available at: http://www.deq.state.or.us/wq/standards/docs/toxics/metals/AppEArsenicIssuePaper.pdf

[108] ODEQ. April 4, 2011. *Issue Paper: Water Quality Standards Review and Recommendations: Arsenic.* Oregon

20 studies is provided below and indicates that the inorganic arsenic in tissues of marine fish and marine shellfish ranged from 0.0001% to 7.3% of the total arsenic present; anadromous fish ranged from 0.3% to 3.04% and freshwater fish tissue contained between 0.5% and 26.6% inorganic arsenic.[109]

Inorganic arsenic as a % of total arsenic in seafood measured as ng/g wet weight

	Mean	Range
Freshwater	7.2	0.5-26.6
Anadromous fish	1.1	0.03-3.04
Marine fish	1.0	0.001-6.9
Marine Crustaceans	1.3	0.001-7.3
Marine Mollusks	1.8	0.04-6.5

Based on the review of the above information, ODEQ concluded it appropriate to use an inorganic factor of 1% if used in association with a conservative BCF of 350. However, if using the less conservative BCF of 26, ODEQ used a more conservative inorganic factor of 10% in their initial scenarios. ODEQ found comparison of these scenarios was a reasonable approach to take into account the variability and uncertainty in both the BCFs and inorganic factors while not resulting in an overly conservative criterion.[110]

Natural ocean levels and complexities in the marine environment

Oregon's review of the literature found natural total arsenic levels of oceans waters to be in the range of 1 to 3 µg/l. Data cited from the Pacific Ocean indicated average concentrations of 1.1 – 1.2 µg/l.[111]

Oregon did not have any data from Oregon's marine waters where inorganic and total arsenic were measured simultaneously. Thus, they relied on the above literature for their conclusion that the natural concentrations of arsenic in Oregon salt waters contain 1.0 µg/l or more of inorganic arsenic and that a waterbody criterion of 1.0 µg/l should not present any greater human health risk than that naturally present.[112]

Department of Environmental Quality. pages 16-17 in Borak and Hosgood, 2007; EPA 2003; Neff, 1997. Available at: http://www.deq.state.or.us/wq/standards/docs/toxics/metals/AppEArsenicIssuePaper.pdf

[109] ODEQ. April 4, 2011. *Issue Paper: Water Quality Standards Review and Recommendations: Arsenic.* Oregon Department of Environmental Quality. pages 16-17 in Schoof and Yager, 2007. Available at: http://www.deq.state.or.us/wq/standards/docs/toxics/metals/AppEArsenicIssuePaper.pdf

[110] ODEQ. April 4, 2011. *Issue Paper: Water Quality Standards Review and Recommendations: Arsenic.* Oregon Department of Environmental Quality. Available at: http://www.deq.state.or.us/wq/standards/docs/toxics/metals/AppEArsenicIssuePaper.pdf

[111] ODEQ. April 4, 2011. *Issue Paper: Water Quality Standards Review and Recommendations: Arsenic.* Oregon Department of Environmental Quality. pages 15-16 in Tanaka, Shigeru and Sri Juari Santosa. 1995. The concentration distribution and chemical form of arsenic compounds in sea water. Biogeochemical Processes and Ocean Flux in the Western Pacific, Eds. H. Sakai and Y. Nozake, page. 1590170. Terra Scientific Publishing Company, Tokyo. Available at: http://www.deq.state.or.us/wq/standards/docs/toxics/metals/AppEArsenicIssuePaper.pdf

[112] ODEQ. April 4, 2011. *Issue Paper: Water Quality Standards Review and Recommendations: Arsenic.* Oregon Department of Environmental Quality. page 15. Available at: http://www.deq.state.or.us/wq/standards/docs/toxics/metals/AppEArsenicIssuePaper.pdf

Carcinogenic Risk Level

For the saltwater organism only criterion of 1.0 µg/l inorganic arsenic represents a carcinogenic risk level of 10^{-5}. Since this value would protect high fish consumers of the State (those consuming 175 grams of fish per day) at a 10^{-5} risk level, Oregon found this criterion would protect the human health uses in State waters at a level consistent with the risk levels recommended by EPA in the 2000 Human Health Methodology.[113] Furthermore, ODEQ determined it was appropriate to use a different carcinogenic risk level for this criterion than that used for other criteria in the state (10^{-6}) since the resultant criterion concentration reflected that which naturally occurred in marine waters.[114] (See the discussion regarding carcinogenic risk level for the freshwater arsenic criteria for more detail regarding EPA's 2000 Human Health Methodology.)

Based on the above findings, Oregon considered the scenarios in Table 11 above when selecting an appropriate org only criterion for arsenic in Oregon's saltwaters. Based on the conservative nature of a BCF of 350, the variability in the data, the uncertainties in the scientific communities current knowledge and ODEQ's determination that "there does not appear that an unacceptable human health risk with eating fish from an unpolluted marine environment," Oregon revised the saltwater criterion for inorganic arsenic to 1.0 µg/l.

c) EPA Review of Oregon's Revised Arsenic Criteria

EPA has reviewed the information provided by Oregon regarding the literature considered during their review of the arsenic criteria. EPA determined that Oregon's review considered the relevant and available information relative to selecting appropriate input variables for deriving the arsenic criteria. EPA conducted a more detailed review of several of the variables used in deriving the criteria. This review is presented below.

(1) FRESHWATER CRITERIA

BCF for Freshwater Criteria

EPA has reviewed the literature used by Oregon to calculate a BCF and finds that all relevant studies were identified. The use of a geometric mean value from available studies is appropriate for deriving a single BCF value. As determined by Oregon, a BCF of 14 is representative of the available BCF data relative to freshwater species.

In EPA's review of the literature relative to bioaccumulation of arsenic in aquatic organisms, no BAF studies specific to bioaccumulation in Oregon or models which could readily produce

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[113] ODEQ. April 5, 2011. *Memo from Dick Pedersen, Director ODEQ, to the Environmental Quality Commission. Agenda Item E. Rule adoption: Amending water quality standards for arsenic, April 21-22, 2011EQC meeting.* Oregon Department of Environmental Quality. Available at: http://www.deq.state.or.us/wq/standards/docs/toxics/metals/EQCItemEStaffReport.pdf

[114] ODEQ. April 4, 2011. *Issue Paper: Water Quality Standards Review and Recommendations: Arsenic.* Oregon Department of Environmental Quality. pages 15-16 in Tanaka and Santosa. 1995 National Academy of Sciences, 1972 and EPA. 2003. Available at: http://www.deq.state.or.us/wq/standards/docs/toxics/metals/AppEArsenicIssuePaper.pdf

bioaccumulation factors specific to Oregon's waters were found. Thus, ODEQ's use of a bioconcentration factor is appropriate in this situation.

In selecting the appropriate BCF for use in deriving freshwater criteria, Oregon reviewed the available data for both saltwater and freshwater organisms and considered whether that data was representative of organisms likely to be consumed from waters to which the criteria would apply. In evaluating the use of the data from a study of the eastern oyster, a saltwater mollusk, Oregon noted that saltwater mollusks are not present in freshwaters of Oregon and that they were "not aware of any mollusks or other shellfish harvested and consumed from Oregon's freshwaters".[115] In order to verify this assertion, EPA consulted the Oregon Department of Fish and Wildlife website.[116] According to the regulations posted on this site, Oregon prohibits the harvest or possession of all freshwater mussels or clams (except for Zebra mussels or Asian clams) except as authorized by a Scientific Take Permit.[117] Furthermore, EPA noted that no freshwater mussels or shellfish were included in the species identified in the CRITFC Fish Consumption Study. While this later fact does not speak to all mussels or shellfish from freshwaters of Oregon, it is one indication that traditional and cultural consumption of these organisms is not occurring in a large portion of Oregon. Based on this information, EPA finds the assumption made by Oregon as to type of organisms consumed from Oregon's freshwaters to be reasonable. While including BCF data from the eastern oyster in the calculations would have expanded the scope of represented species to include mollusks, it would have also contributed BCF data from a marine species into the calculation of freshwater criteria. EPA concludes that Oregon's decision not to include the BCF data from the eastern oyster was appropriate, in light of the above data with respect to the low likelihood of human consumption of freshwater mollusks in Oregon.

One commenter provided numerous comments relative to the use of a BCF instead of a site-specific BAF. In the 2000 Human Health Methodology EPA recommends using a BAF in cases where data are available. EPA's review of the literature indicates that data and models are not currently available to develop a state-specific BAF for waters in Oregon. Additional information on this topic can be found in the above description of the methodology used to develop criteria for noncarcinogens and in EPA's Response to Comments document developed in association with the recent June 1, 2010 action on Oregon's human health criteria adopted in 2004.[118] The same commenter noted that recent studies of arsenic bioaccumulation indicate use of a regression approach to developing arsenic criteria may be more appropriate than using a single criterion applicable to all waters. EPA reviewed the cited study and agrees that it is an approach that has been applied on a site-specific basis and could be applied by a state in developing criteria for arsenic. However, EPA has not developed a recommended approach for

[115] ODEQ. April 4, 2011. *Issue Paper: Water Quality Standards Review and Recommendations: Arsenic.* Oregon Department of Environmental Quality. Available at: http://www.deq.state.or.us/wq/standards/docs/toxics/metals/AppEArsenicIssuePaper.pdf
[116] Oregon Department of Fish and Wildlife (ODFW). *Oregon Wildlife Species: Sport Fish Species of Oregon.* Available at: www.dfw.state.or.us/species/fish/index.asp
[117] Oregon Department of Fish and Wildlife (ODFW). *2011 Sport Fishing Regulations.* Available at: http://www.dfw.state.or.us/fish/docs/2011_Oregon_Fish_Regs.pdf
[118] EPA. June 1, 2010. Supplemental Response to Comments Submitted by Northwest Environmental Advocates (NWEA) as They Pertain to Oregon's New and Revised Human Health Water Quality Criteria for Toxics Submitted on July 8, 2004.

incorporating this approach into a water quality criterion and no state has used it to develop a water quality criterion. Utilization of a regression approach would result in a criterion expressed as an equation for calculating a criterion concentration which varies with the ambient level of arsenic present in a waterbody in order to take into account the fact that the fraction of total arsenic that is inorganic arsenic tends to decrease as the concentration in the tissues increase. Additional questions regarding whether the criteria would more appropriately be expressed as a water column or tissue concentration would also need to be addressed. While utilizing this approach to developing a state-wide criterion would result in a site-specific criterion that may more accurately reflect the desired level of protection at any particular site (i.e. a 10^{-5} risk level), it would not necessarily provide for a greater level of protection. Given that this level of detail is not needed to protect the use and that this method has never been applied to derive a water quality criterion, EPA finds that it was reasonable for Oregon to establish a single criterion concentration and not use this new approach in this rule revision.

Inorganic Proportion Factor for Freshwater Criteria

EPA's review of available information finds that an inorganic proportion factor of 10% represents a reasonable and conservative estimate of the proportion of total arsenic present in an inorganic form in the tissue of organisms collected from freshwaters in Oregon. EPA notes that this same value was used by EPA when conducting site-specific risk assessments in the Columbia and Willamette Rivers that considered the same data set. No additional data have become available since the EPA assessments.

Level of Protection Provided by the Freshwater Criteria

Oregon's arsenic criteria for fresh waters are established at a level that protect high fish consumers in Oregon at carcinogenic risks levels of between 1×10^{-4} to 1×10^{-5} (see more detailed discussion above). EPA's 2000 Human Health Methodology states that states have the flexibility to choose an appropriate risk level for use in deriving water quality criteria as long as it protects the use to the levels recommended by EPA. Those risk levels are a 10^{-5} or 10^{-6} risk level for the general population and a risk level that does not exceed 10^{-4} for highly exposed populations.

Oregon's criteria were established using a fish consumption rate of 175 grams per day, reflective of the 95th percentile of consumption in a high-consuming subpopulation in Oregon and the 90th percentile of data from regional surveys of high consuming subpopulations. Therefore, the criteria represent the level of exposure expected to occur in highly exposed populations of Oregon. As such, Oregon's freshwater arsenic criteria protect highly exposed populations of Oregon at a level consistent with EPA's recommendations (does not exceed 10^{-4} risk level).

EPA has recommended using a fish consumption rate for the general US population of 17.5 grams per day if no local or regional data is available. There is currently no available fish consumption data specific to the general population of Oregon. If one were to evaluate the protectiveness of Oregon's arsenic criteria at EPA's default fish consumption rate of 17.5 grams per day, the result would indicate a carcinogenic risk level between $1x10^{-6}$ and $1x10^{-5}$. This risk level is consistent with that recommended by EPA. Therefore, EPA finds that ODEQ's revised arsenic criteria for freshwater are established at a level protective of both the general population and high fish consuming populations consistent with the levels recommended by EPA in the

2000 Human Health Methodology.

(2) SALTWATER CRITERIA

BCF for Saltwater Criteria

EPA has reviewed the literature used by Oregon to calculate the BCF used to derive the saltwater criterion and finds that all relevant studies were identified. EPA also found the use of a geometric mean value to be appropriate for deriving a BCF. As considered by Oregon, a BCF of 26 is representative of all available BCF data for both saltwater and freshwater species (one study of a saltwater mollusk and three studies of freshwater finfish). A BCF of 350 reflects all of the available BCF data for saltwater species (one study of a saltwater mollusk). Oregon considered both of these BCF values when evaluating the protectiveness of the revised criterion.

As noted by Oregon, there is relatively little BCF data available for arsenic and only one study that addresses saltwater species. Given the limited data and the differences in BCF between the finfish and mollusk data, EPA finds Oregon's approach of comparing the outcomes of scenarios for both a BCF of 26 and a BCF of 350 in terms of protectiveness to be reasonable. (See Table 11 above). Given the limited data and the variability in the available data, EPA believes that evaluating the level of protection provided by a range of inorganic proportion factors in association with the different BCF values is also appropriate. EPA's evaluation of whether the criteria derived using these input values is protective of the use is provided below.

Inorganic Proportion Factor for Saltwater Criterion

EPA's review of the literature relative to the ratio of inorganic to total arsenic in the tissue of saltwater organisms indicated that ODEQ reviewed the available information on this subject. EPA concurs that the information is limited, especially specific to Oregon waters, but it does indicate that the ratio of inorganic to total arsenic in tissues of saltwater organisms is typically lower than that found in freshwater organisms. Thus, using the 10% inorganic ratio that is also used in the freshwater criteria serves to provide a conservative estimate of the ratio—i.e., one that is larger than the mean ratio values found in various studies (1 to 3%). Given the variability in these factors and in the BCF values discussed above, EPA believes it was appropriate for ODEQ to have considered several different exposure scenarios when developing this criterion and that ODEQ's use of inorganic factors of 10% and 1% in the scenarios was also reasonable. EPA's evaluation of whether the criteria derived using these input values is protective of the use is provided below.

Level of Protection Provided by the Saltwater Criteria

Oregon adopted a saltwater criterion of 1 µg/l and relied on multiple lines of evidence in determining it is protective of Oregon's human health uses. Consistent with Oregon's approach at evaluating scenarios, EPA has evaluated the level of protection provided by each scenario presented. As illustrated in Table 11 above, when the more conservative BCF (350) was paired with the less conservative inorganic proportion factor (1%), a criterion of 1.0 µg/L was found to protect high fish consuming populations (175 g/day) at a 1.3×10^{-5} risk level. When the less conservative BCF (26) was paired with the more conservative inorganic proportion factor (10%), a criterion of 1.0 µg/l was found to protect high consumers (175 g/day) at a 1.0×10^{-5} risk level. Both of these scenarios provide a level of protection consistent with that recommended by EPA

in the 2000 Human Health Methodology. However, when EPA evaluated the level of protection that would be provided using the more conservative of both factors (BCF of 350 and inorganic proportion factor of 10%), a criterion of 1.0 µg/l resulted in a 1.3×10^{-4} risk level. This level is a higher risk than that recommended by EPA in the 2000 Human Health Methodology. EPA notes that the highest ratio of inorganic to total arsenic in fish tissue of saltwater organisms identified by ODEQ was 7.3%. ODEQ used 10% as a conservative inorganic proportion value for marine criteria (incorporating data from freshwater species) but EPA believes 7.3% is also a conservative estimate for marine organisms as it is the highest data value reported. Combining an inorganic factor of 7.3% (not as conservative a value as selected by Oregon but still sufficiently conservative based on a reasonable assessment of the available data) with a BCF of 350 (more conservative than the value ultimately selected by Oregon), EPA calculated that a criterion of 1.0 µg/L would protect high fish consuming populations at a risk level of 9.6×10^{-5}. Thus, a criterion of 1.0 µg/l calculated using a conservative inorganic proportion factor of 7.3% would protect high fish consumers in Oregon at a level consistent with that recommended by EPA in the 2000 Human Health methodology.

Oregon has presented a reasonable scientific basis to not rely solely on the BCF from the eastern oyster (350) in calculating the saltwater criterion, and instead rely on a BCF that incorporates data from other species (26).[119] Furthermore, the percentage of total arsenic that occurs in an inorganic form that Oregon paired with this BCF (10%) was more than sufficiently conservative based on the available data. Based on the calculations discussed in the paragraph above and these additional considerations, EPA believes that Oregon's saltwater criterion for arsenic will protect human health consistent with the level recommended by EPA.

(3) GENERAL CONSIDERATIONS

Risk level applied to arsenic criteria relative to that applied to other criteria

EPA reviewed the information provided by Oregon related to establishing criteria for arsenic at a level different than that used for all other criteria in the State. EPA notes that ODEQ stated that they were addressing arsenic as a special case and clearly stated their reasons for evaluating risk management decisions relative to this pollutant. The public notice, memorandum presenting recommendations to the EQC and ODEQ's document presenting its review and recommendations for the arsenic criteria all clearly identify that the criteria recommendations were established at a level providing less protection than for other pollutants in Oregon. Thus, the Commission was made aware of the policy decision inherent in their decision to adopt the recommended criteria. Thus, EPA finds that Oregon was reasonably exercising its discretion when establishing an alternate risk level for the arsenic criteria.

Cancer Slope Factor

One commenter noted that a cancer slope factor of $1.75(\text{mg/kg/day})^{-1}$ was used by EPA to develop the current 304(a) criteria recommendation while another stated that EPA was currently

[119] Mollusks tend to accumulate arsenic to a greater extent than other species and mollusks represent only a small percent (3-13%) of the U.S. general population's total fish and shellfish consumption. A marine BCF that is only based on mollusk data is therefore not ideally representative of marine species overall. EPA concludes that it was reasonable for Oregon to incorporate data from non-mollusk species to arrive at a more representative BCF, even though those non-mollusk species were not marine species.

reviewing the science behind the cancer slope factor. Both of these assertions are correct. EPA's 304(a) criteria recommendations for arsenic were first published in 1986 and uses a cancer slope factor of 1.75(mg/kg/day)$^{-1}$. This recommendation has not been updated to reflect the latest value identified in the IRIS database, in part because the science behind that number is currently under review. A draft document was circulated for public comment and peer review by the Science Advisory Board in 2010.[120] EPA is currently reviewing these comments and has yet to make a final determination on potential revisions to the cancer slope factor for arsenic. Thus, EPA does not believe it appropriate for ODEQ to use the draft value in revising these criteria. EPA expects to coordinate with ODEQ regarding the potential need for reevaluation of the criteria if a new value is established in IRIS and/or changes are made to EPA's 304(a) criteria recommendations for arsenic.

3. EPA Action and Rationale Regarding Oregon's Arsenic Criteria

EPA Action
In accordance with its Clean Water Act authority, 33 U.S.C § 1313(c)(3) and 40 C.F.R. part 131, EPA approves Oregon's revised human health toxic criteria for inorganic arsenic because they are protective of Oregon's fishing and water supply uses. EPA is also approving footnote A which states: *The arsenic criteria are expressed as total inorganic arsenic. The "organism only" criteria are based on a risk level of approximately 1.1 x 10^{-5}, and the "water + organism" criterion is based on a risk level of 1.1 x 10^{-4}.*

EPA Rationale
EPA's WQS regulations require that criteria protect the designated uses. As noted previously, Oregon's human health criteria apply to waters with fishing and water supply uses and thus must be established at a level that will protect those uses. Therefore, EPA must evaluate whether the criteria protect Oregon's human health uses.

As discussed in detail above, EPA has found that Oregon considered the available and relevant literature in revising Oregon's arsenic criteria. Oregon provided a reasonable basis for the decisions made in developing the criteria. All three of the criteria adopted by ODEQ were found to protect human health uses consistent with recommendations provided in EPA's 2000 Human Health Methodology.

Inorganic Arsenic and Footnote A in Table 40
EPA's current 304(a) human health criteria recommendations are specifically identified as criteria for inorganic arsenic. As noted above, inorganic arsenic is the form most toxic to humans. As such, EPA's recommendations relative to this criteria and the associated risk assessment input variables are expressed as inorganic arsenic. In this revision, Oregon specifically identified that the criteria as inorganic arsenic in Table 40 by placing the word "inorganic" in parentheses.

[120] February 19, 2010. *Federal Register*, Volume: 75, No.: 33, page: 7477 (78 FR 7477). Available at: http://www.gpo.gov/fdsys/pkg/FR-2010-02-19/pdf/FR-2010-02-19.pdf

In addition, EPA is approving footnote A to the arsenic criteria in Table 40 which states: *The arsenic criteria are expressed as total inorganic arsenic. The "organism only" criteria are based on a risk level of approximately 1.1 x 10^{-5}, and the "water + organism" criterion is based on a risk level of 1.1 x 10^{-4}.*

The first sentence of the footnote provides clarification that the human health criterion for arsenic is expressed as total inorganic. This new footnote language for arsenic is consistent with EPA's recommended 304(a) national default expression for the arsenic criterion. The second sentence of the footnote clearly articulates the input variables regarding risk levels that were used to derive the arsenic criteria. This footnote establishes a legally binding requirement under State law and helps describe a desired ambient condition of a waterbody to support a particular designated use and is therefore considered a WQS subject to EPA review and approval under 303(c) of the CWA. The description of the applicable expression of arsenic associated risk level is a component of the overall level of protection afforded by the arsenic criteria. Therefore, EPA approves this footnote as a WQS.

Acknowledgement of Maximum Contaminant Level (MCL) in Table 20
ODEQ revised the drinking water MCL for arsenic from 0.05 mg to 10 µg/l in Table 20 and added footnote 1 which states: *The arsenic value is shown here for informational purposes only and is not a water quality criterion.*

Drinking water standards are regulations that EPA sets to control the level of contaminants in the nation's drinking water. In most cases, the standard is a MCL**,** the maximum permissible level of a contaminant in water which is delivered to any user of a public water system. The Safe Drinking Water Act gives individual states and tribes the opportunity to set and enforce their own drinking water standards if the standards are at least as stringent as EPA's national standards. When making a determination to regulate, the Safe Drinking Water Act requires consideration of these three criteria:

- the potential adverse effects of the contaminant on the health of humans;
- the frequency and level of contaminant occurrence in public drinking water systems; and
- whether regulation of the contaminant presents a meaningful opportunity for reducing public health risks.

ODEQ revised their MCL value for arsenic from 0.05 mg to 10 µg/l in Table 20. This revision reflects the current level set under the Safe Drinking Water Act and is consistent with EPA recommended drinking water MCL.[121] ODEQ also added a clarifying footnote which explains that the MCL value is not a water quality criterion.

[121] January 22, 2001. *Federal Register*, Volume: 66, No.: 14, page: 6976 (66 FR 6976). *Arsenic and Clarifications to Compliance and New Source Contaminants Monitoring Final Rule.* Available at: http://www.epa.gov/fedrgstr/EPA-WATER/2001/January/Day-22/w1668.htm
March 25, 2003. *Federal Register*, Volume: 68, No.: 57, page: 14501 (68 FR 14501). *Minor Clarification of National Primary Drinking Water Regulation for Arsenic; Final Rule.* Available at: http://www.gpo.gov/fdsys/pkg/FR-2003-03-25/html/03-7048.htm

Since Oregon has not adopted the arsenic MCL value as a water quality criterion, is not considered WQS under the CWA. Instead, the MCL is a value that the State uses to set the maximum permissible level of arsenic in drinking water delivered to the tap (after treatment) consistent with the Safe Drinking Water Act, not a value that surface waters of the State must meet. MCLs are enforceable standards under the Safe Drinking Water Act, and are not required under the Clean Water Act unless determined by the State to be needed to protect the designated uses. For these reasons, EPA is taking no action to approve or disapprove the revised MCL value for arsenic.

Based on the above, EPA has determined that Oregon's MCL value for arsenic is not a WQS subject to EPA review and approval under Section 303(c) of the CWA. As a result, EPA is taking no action to approve or disapprove this MCL value.

Provision Establishing the Effective Date for Arsenic at OAR 340-041-0033(2)(b)
The following language was added to Oregon's WQS at OAR340-041-0033 – Toxic Substances as part of Oregon's April 21, 2011 rule revisions submitted to EPA on July 12, 2011:

OAR 340-041-0033(2)(b) The arsenic criteria in Table 20 established by this rule do not become applicable for purposes of ORS chapter 468B or the federal Clean Water Act unless and until they are approved by EPA pursuant to 40 CFR 131.21 (4/27/2000).

As part of Oregon's subsequent June 16, 2011 rule revisions submitted to EPA on July 21, 2011, Oregon removed and renumbered the provision cited above language at OAR 340-041-0033(3)(b) when it reformatted the toxics criteria tables, thus moving the arsenic criteria to Table 40. Since the deleted language was submitted to EPA as part of the June 16, 2011 rule revisions, the provision is no longer applicable under state law and there is no requirement for EPA to act on the provision under Section 303(c) of the CWA.
~~*OAR 340-041-0033(3)(b) The arsenic criteria in Table 20 established by this rule do not become applicable for purposes of ORS chapter 468B or the federal Clean Water Act unless and until they are approved by EPA pursuant to 40 CFR 131.21 (4/27/2000).*~~

Since ODEQ deleted the language l as part of the July 21, 2011 submittal to EPA, the provision is not applicable under State law and there is no requirement for EPA to evaluate the provision under Section 303(c) of the CWA.

In the July 21, 2011 submittal, ODEQ addressed the effective dates of the criteria, including arsenic, in the associated revisions at OAR 340-041-0033(1) which describe the dates when the toxics criteria in Tables 20, 33A, 33B and 40 become effective under State law and the Clean Water Act. EPA's rationale for approval of OAR 340-041-0033(1) is explained in section V of this document.

Acknowledgement of the Arsenic Reduction Policy at OAR 340-041-0033(7)
In conjunction with this rule and in recognition that the revised criteria provide a lower level of protection than other human health criteria in Oregon, an Arsenic Reduction Policy was adopted under State law at OAR 340-041-033(4). To accommodate additional revisions associated with the rulemaking submitted to EPA on July 21, ODEQ reorganized the location of the rule and

moved the arsenic reduction policy section to OAR 340-041-0033(7). However, ODEQ did not revise any of the rule language that was previously adopted. The policy was included in Oregon's WQS regulation in the same section as the arsenic criteria to help ensure it was applied where applicable. The policy requires that, in situations where water bodies have background levels below the arsenic criteria, dischargers with the potential to affect a drinking water supply develop an arsenic reduction plan and take feasible steps to reduce arsenic loading.

The new policy does not establish a legally binding ambient condition for a waterbody to support a particular designated use. Nor does it establish a binding process whereby the State would establish an alternate ambient condition for a waterbody following a public process. Rather, this policy outlines permitting requirements that the State will place on selected dischargers (those located in a surface water drinking water protection area as delineated under the Safe Drinking Water Act). These permitting requirements are not tied to what is necessary to protect the designated uses of Oregon's waters, but rather to what measures are "feasible" to reduce arsenic loading. The permitting requirements are to be used in association with other implementation tools to encourage further arsenic reductions below the established criteria, but they do not modify those criteria.

In the Response to Comments, ODEQ states that the arsenic reduction policy is an important component of Oregon's WQS but that the intent of the policy is not to alter the numeric criteria. Furthermore, ODEQ specifies that the policy applies to specific sources and circumstances and requires that feasible reduction steps be taken.[122]
Based on the above, EPA has determined that this policy is not a WQS subject to EPA review and approval under Section 303(c) of the CWA. As a result, EPA is taking no action to approve or disapprove this provision.

F. *NEW, REVISED AND WITHDRAWN FOOTNOTES*

As part of the July 21, 2011 submittal, ODEQ added, revised and withdrew several footnotes. In addition to footnote J (for methylmercury) and footnote A (for arsenic) which are discussed separately above with those individual criteria, these changed footnotes are described in further detail below.

1. New Footnotes

ODEQ has added new footnotes for the following three pollutants: barium, cyanide, and PCBs.

<u>Footnote C: Barium</u>
The human health criterion for barium is the same as originally published in the 1976 EPA Red Book which predates the 1980 methodology and did not utilize the fish ingestion BCF approach. This same criterion value was also published in the 1986 EPA Gold Book. Human health risks are primarily from drinking water, therefore no "organism only" criterion was developed. The

[122] ODEQ. March 2011. *Summary of Public Comment and Agency Response. Amending Oregon's Water Quality Standards: Revising Human Health Criteria for Arsenic.* Oregon Department of Environmental Quality. page 26. Available at: http://www.deq.state.or.us/wq/standards/docs/toxics/metals/AttCArsenicPublicComment.pdf

"water + organism" criterion is based on the Maximum Contaminant Level (MCL) established under the Safe Drinking Water Act.

Footnote G: Cyanide
The cyanide criterion is expressed as total cyanide (CN)/L.

Footnote L: PCBs
This criterion applies to total PCBs (e.g. determined as Aroclors or congeners).

Acknowledgement of Barium Footnote C
The new footnote C for barium clarifies the source of information upon which the criterion is based. However, the footnote does not establish a legally binding requirement under State law nor does it describe a desired ambient condition of a waterbody to support a particular designated use. Therefore this footnote is not considered a WQS subject to EPA review and approval under 303(c) of the CWA. As a result, EPA is taking no action to approve or disapprove the new footnote for barium. The underlying criterion for barium was unrevised and therefore EPA is not reviewing the underlying criterion as part of this action.

EPA acknowledges that the footnote provides accurate information respecting the human health criterion development for barium. The new footnote for barium explains that the criterion is based upon a Safe Drinking Water MCL value along with the rationale for why an "organism only" criterion does not exist. The human health criterion for barium was not derived using EPA's 2000 Methodology, but instead was based upon EPA's national 304(a) criteria recommendations in EPA's 1986 Gold Book.

EPA Approval of Footnotes for Cyanide (footnote G) and PCBs (footnote L)
In accordance with its Clean Water Act authority, 33 U.S.C § 1313(c)(3) and 40 C.F.R. part 131, EPA approves Oregon's addition of the two footnotes, Footnote G for cyanide and Footnote L for PCBs, as consistent with EPA's current CWA § 304(a) criteria recommendations.

EPA Rationale Regarding Footnotes for Cyanide (footnote G) and PCBs (footnote L)
Oregon's new footnote G for cyanide explains that the criterion is expressed as total cyanide (CN)/L. EPA has reviewed this footnote language and the 304(a) criteria recommendation, which states that the "recommended water quality criterion is expressed as total cyanide, even though the IRIS RfD used to derive the criterion is based on free cyanide. The multiple forms of cyanide that are present in ambient water have significant differences in toxicity due to their differing abilities to liberate the CN-moiety. Some complex cyanides require even more extreme conditions than refluxing with sulfuric acid to liberate the CN-moiety. Thus, these complex cyanides are expected to have little or no 'bioavailability' to humans. If a substantial fraction of the cyanide present in a water body is present in a complex form (e.g., $Fe_4[Fe(CN)_6]_3$), this criterion may be over conservative."[123] Oregon's new footnote language along with the human

[123] EPA. *National Recommend Ambient Water Quality Criteria for the Protection of Aquatic Life and Human Health.* Published pursuant to section 304(a) of the Clean Water Act. Footnote jj. Available at: http://www.epa.gov/waterscience/criteria/wqctable/index.html

health criterion values for cyanide are consistent with EPA's recommended 304(a) national default values for calculating the criterion.

This footnote establishes a legally binding requirement under state law and helps describe a desired ambient condition of a waterbody to support a particular designated use and is therefore considered a WQS subject to EPA review and approval under 303(c) of the CWA. The description of the applicable form of cyanide is a component of the overall description of the level of protection afforded by the criterion. Since this footnote specifies the applicable form of the cyanide criterion Oregon adopted, EPA approves this footnote as a WQS. EPA is approving the associated numeric criteria for cyanide as discussed above in section IV.

Oregon's new footnote L for PCBs explains that the criterion applies to total PCBs. EPA has reviewed this footnote language and the 304(a) criteria recommendations, which states that the "criterion applies to total PCBs, (e.g., the sum of all congener or all isomer or homolog or Aroclor analyses.)"[124] Oregon's new footnote language along with the human health criterion values for PCBs are consistent with EPA's recommended 304(a) national default values for calculating the criterion.

This footnote establishes a legally binding requirement under state law and helps describe a desired ambient condition of a waterbody to support a particular designated use and is therefore considered a WQS subject to EPA review and approval under 303(c) of the CWA. The description of the applicable form of PCBs is a component of the overall description of the level of protection afforded by the criterion. Since this footnote specifies the applicable form of the PCB criterion Oregon adopted, EPA approves this footnote as a WQS. EPA is approving the associated numeric criteria for PCBs as discussed above in section IV.

2. Revised Footnotes

ODEQ has revised the footnotes below for the following six pollutants: footnote B: asbestos, footnote D: chlorophenoxy herbicide (2,4,5,-TP), footnote E: chlorophenoxy herbicide (2,4,-D), footnote F: copper, footnote I: methoxychlor, and footnote K: nitrates.

Table 12: Revised Footnotes.

Id.	Pollutant	Previous Footnote	New Footnote
B	Asbestos	*Human health criteria for carcinogens reported for three risk levels. Value presented is the 10-6 risk level, which means the probability of one cancer case per million people at the stated concentration.*	*The human health risks from asbestos are primarily from drinking water, therefore no "organism only" criterion was developed. The "water + organism" criterion is based on the Maximum Contaminant Level (MCL) established under the Safe Drinking Water Act.*
D	Chlorophenoxy Herbicide (2,4,5,-TP)	*This value is based on a Drinking Water regulation.*	*The Chlorophenoxy Herbicide (2,4,5,-TP)criterion is the same as originally*

[124] EPA. *National Recommend Ambient Water Quality Criteria for the Protection of Aquatic Life and Human Health.* Published pursuant to section 304(a) of the Clean Water Act. Footnote N. Available at: http://www.epa.gov/waterscience/criteria/wqctable/index.html

			published in the 1976 EPA Red Book which predates the 1980 methodology and did not utilize the fish ingestion BCF approach. This same criterion value was also published in the 1986 EPA Gold Book. Human health risks are primarily from drinking water, therefore no "organism only" criterion was developed. The "water + organism" criterion is based on the Maximum Contaminant Level (MCL) established under the Safe Drinking Water Act.
E	Chlorophenoxy Herbicide (2,4,-D)	*This value is based on a Drinking Water regulation.*	*The Chlorophenoxy Herbicide (2,4,-D) criterion is the same as originally published in the 1976 EPA Red Book which predates the 1980 methodology and did not utilize the fish ingestion BCF approach. This same criterion value was also published in the 1986 EPA Gold Book. Human health risks are primarily from drinking water, therefore no "organism only" criterion was developed. The "water + organism" criterion is based on the Maximum Contaminant Level (MCL) established under the Safe Drinking Water Act.*
F	Copper	*This value is based on a Drinking Water regulation.*	*Human health risks from copper are primarily from drinking water, therefore no "organism only" criterion was developed. The "water + organism" criterion is based on the Maximum Contaminant Level (MCL) established under the Safe Drinking Water Act.*
I	Methoxychlor	*No BCF was available; therefore, this value is based on that published in the 1986 EPA Gold Book.*	*The human health criterion for methoxychlor is the same as originally published in the 1976 EPA Red Book which predates the 1980 methodology and did not utilize the fish ingestion BCF approach. This same criterion value was also published in the 1986 EPA Gold Book. Human health risks are primarily from drinking water, therefore no "organism only" criterion was developed. The "water + organism" criterion is based on the Maximum Contaminant Level (MCL) established under the Safe Drinking Water Act.*
K	Nitrates	*No BCF was available; therefore, this value is based on that published in the 1986 EPA Gold Book.*	*The human health criterion for nitrates is the same as originally published in the 1976 EPA Red Book which predates the 1980 methodology and did not utilize the fish ingestion BCF approach. This same criterion value was also published in the 1986 EPA Gold Book. Human health risks are primarily from drinking water, therefore no "organism only" criterion was developed. The "water +*

			organism" criterion is based on the Maximum Contaminant Level (MCL) established under the Safe Drinking Water Act.

EPA Review
All six of these revised footnotes clarify the sources of information upon which the criteria are based. The footnotes are not considered water quality standards because they do not establish legally binding requirements under State law and do not describe a desired ambient condition of a waterbody to support a particular designated use. Therefore they are not water quality standards subject to EPA review and approval under 303(c) of the CWA. As a result, EPA is taking no action to approve or disapprove the revised footnotes for these six pollutants.

The revised footnotes identified above explain in more detail than the previous footnotes that the criteria are based upon a Safe Drinking Water MCL value in addition to an explanation concerning the rationale for why an "organism only" criterion does not exist. These human health criteria were not derived using EPA's 2000 Methodology, but instead were based upon EPA's national 304(a) criteria recommendations in EPA's 1986 Gold Book and developed under the Safe Drinking Water Act. EPA has reviewed these footnotes and found them to be accurate regarding the human health criteria development for these six pollutants. The underlying toxics criteria for asbestos and copper were approved by EPA on June 1, 2010. The underlying toxics criteria for chlorophenoxy herbicide (2,4,5,-TP), chlorophenoxy herbicide (2,4,-D), methoxychlor, and nitrates have not been revised and thus are not addressed in this action. These values remain consistent with EPA's current 304(a) criteria recommendations.

3. Withdrawn Footnotes

ODEQ has removed the footnote below for the three pollutants to which it applied: hexachlorocyclo-hexane-technical, nitrosamines, and nitrosodiethylamine, N:
No BCF was available; therefore, this value is based on that published in the 1986 Gold Book.

EPA Review
EPA's current CWA 304(a) criteria recommendations include the following BCF values for these three pollutants:

- Hexachlorocyclo-hexane-technical: BCF value = 130
- Nitrosamines: BCF value = 0.20
- Nitrosodiethylamine, N: BCF value = 0.20

At the time of Oregon's previous adoption of human health criteria for these three pollutants, EPA's 304(a) criteria recommendations were not derived using a methodology that accounted for bioconcentration through the use of a BCF. EPA now recommends the use of the BCF values listed above. Consistent with EPA's recommended 304(a) national default values for calculating the human health criteria, ODEQ has updated the criteria for these three pollutants to include EPA's recommended BCF values and therefore the three footnotes are no longer accurate or relevant. EPA is approving Oregon's human health criteria for hexachlorocyclo-hexane-

technical, nitrosamines, and nitrosodiethylamine, N as discussed above in section IV as consistent with EPA's 304(a) guidance.

Therefore, as a result of updating the human health criteria for these three pollutants, the footnotes are no longer accurate and relevant and removing them is appropriate. Furthermore, these three footnotes were not water quality standards because they did not establish legally binding requirements under state law and they did not describe a desired ambient condition of a waterbody to support a particulate designated use. Rather, the footnotes clarified the source of information, EPA's 1986 Gold Book, upon which the criteria were based. For this reason, the footnotes were not considered WQS subject to EPA review and approval under 303(c) of the CWA. As a result, EPA is taking no action to approve or disapprove the removal of the footnote as applied to hexachlorocyclo-hexane-technical, nitrosamines, and nitrosodiethylamine, N.

G. *WITHDRAWN HUMAN HEALTH CRITERIA WHICH WERE REPLACED BY MORE SPECIFIC CRITERIA*

During this rule revision, Oregon updated its numeric human health toxics criteria to reflect EPA's most recent science and refinements as published in EPA's current CWA § 304(a) criteria recommendations. Included in the refinements recommended by EPA was the removal of 13 general human health criteria developed for families of pollutants and the replacement of these criteria by other criteria that address the specific chemical(s) of concern for human health protection. The 13 chemicals that ODEQ has removed and replaced with criteria for specific chemical compounds are consistent with EPA's current 304(a) criteria recommendations. They are listed and explained in Table 13 below.

Table 13: Withdrawn human health criteria replaced with more specific criteria.

No.	Withdrawn Criteria	Replacement Criteria	Explanation[125]
1	Dinitrotoluene	*Dinitrotoluene 2,4*	More specific and more stringent of the two compounds was retained.
2	Dinitro-o-Cresol 2,4	Dinitrophenol 2,4; Dinitrophenols	Alternative compounds, including a synonym, in the same family identified.
3	Diphenylhydrazine	Diphenylhydrazine 1,2	More specific compound in the same family identified.
4	Endosulfan	Endosulfan Alpha; Endosulfan Beta; Endosulfan Sulfate	More specific compounds in the same family identified.
5	Halomethanes	Chlorodibromomethane; Dichlorobromomethane; Bromoform; *Chloroform*	More specific compounds in the same family identified.
6	Monochlorobenzene	Chlorobenzene	Identical compound, the two criteria names are synonyms.

[125] Explanations in the table were developed with information from EPA's "Gold Book". EPA. May 1, 1986. *Quality Criteria for Water*. U.S. Environmental Protection Agency, Office of Water. 440/5-86-001. Available at: https://owpubauthor.epa.gov/scitech/swguidance/standards/upload/2009_01_13_criteria_goldbook.pdf

7	Polynuclear Aromatic Hydrocarbons	Acenaphthene; Anthracene; Fluorene; *Fluoranthene;* Pyrene; Chyrsene; Dibenzo(a,h)anthracene; Benzo(a)anthracene; Benzo(a)pyrene; Benzo(b)fluorantehene 3,4; Benzo(k)fluoranthene; Indeno(1,2,3-cd)pyrene	More specific compounds in the same family identified.
8	Chlorinated Benzenes	Chlorobenzene	More specific compound in the same family identified.
9	DDT	DDD 4,4'; DDE 4,4'; DDT 4,4'	More specific compounds in the same family identified.
10	Dichlorobenzenes	*Dichlorobenzene(m) 1,3*; Dichlorobenzene(o)1,2; Dichlorobenzene(p) 1,4	More specific compounds in the same family identified.
11	Dichloroethylenes	Dichloroethylene 1,1; Dichloroethylene trans 1,2	More specific compounds in the same family identified.
12	Dichlorobenzidine	*Dichlorobenzidine 3,3'*	More specific and more sensitive of the two compounds was retained.
13	Dichloropropene	*Dichloropropene 1,3*	More specific and more sensitive of the two compounds was retained.

Note: Chemicals listed in *italics* are criteria that Oregon had previously adopted and which EPA had previously approved. EPA is taking no action on these criteria. All other pollutants listed in the replacement criteria column, new criteria have been adopted by Oregon and are approved by EPA as part of this action.

EPA Review

In 2000 and 2003 EPA refined its "priority" list of toxic pollutants and 304(a) human health criteria recommendations specific to a number of pollutants on that list.[126] The criteria for the 13 pollutants listed above have been refined in three ways:

1. EPA previously had established recommended criteria for large chemical families of pollutants. Advances in scientific information have allowed EPA to refine its criteria recommendations by developing criteria for specific chemical forms (i.e. isomers or congeners) of a pollutant within the larger chemical family. For example, while the *Gold Book* published only a single criterion for DDT, subsequent revisions (see EPA's 2004 *National Recommended Water Quality Criteria*) have resulted in multiple criteria for DDT and two metabolites: 4,4' DDT, 4,4' DDE and 4,4' DDD. Similarly, while the *Gold Book* recommended a single criterion for dichlorobenzenes in the *Gold Book*, EPA's 2004 *National Recommended Water Quality Criteria*, recommends criteria for 1,2-dichlorobenzene, 1,3-dichlorobenzene, and 1,4-dichlorobenezene;

[126] November 3, 2000. *Federal Register*, Volume: 65, Issue: 214, page: 66443 (65 FR 66443). Available at: http://www.epa.gov/fedrgstr/EPA-WATER/2000/November/Day-03/w27924.htm
December 31, 2003. *Federal Register*, Volume: 68, Issue: 250, page: 75507 (68 FR 75507). Available at: http://edocket.access.gpo.gov/2003/pdf/03-32211.pdf

2. EPA has replaced some of the toxic pollutant names with synonyms for specific chemicals.[127] For example, while the *Gold Book* contained criteria for hexachlorocyclohexane-alpha, hexachlorocyclohexane-beta, and hexachlorocyclohexane-gamma, these criteria are now listed under the synonyms alpha BHC, beta BHC and gamma BHC in EPA's *National Recommended Water Quality Criteria*; and
3. EPA has condensed certain pollutants from several chemical forms of a given compound into a single compound, such as recommending criteria for total arsenic in EPA's 2004 *National Recommended Water Quality Criteria* to replace the previously recommended criteria for arsenic (tri) and arsenic (pent) as published in the *Gold Book*.

In updating its numeric toxics human health criteria, Oregon revised the criteria consistent with EPA's most recent CWA § 304(a) criteria recommendations, including withdrawing and/or revising the criteria as recommended by the above changes. The criteria withdrawn based on these refinements in chemical names are identified in Table 13 above. The table further identifies the pollutants for which Oregon has adopted new criteria to address the human health impacts associated with these pollutants. EPA action on the new criteria were addressed previously as part of EPA's action on Oregon's new criteria in section IV.B.

EPA Approval

In accordance with its Clean Water Act authority, 33 U.S.C § 1313(c)(3) and 40 C.F.R. part 131, EPA approves the withdrawal of Oregon's human health criteria for the 13 pollutants identified in Table 13, coupled with EPA's approval of new criteria (in section IV.B), as protective of human health. These changes are consistent with EPA's current CWA § 304(a) criteria recommendations to replace the specified criteria with more specific criteria for associated pollutants consistent with the latest science. EPA has approved the more specific pollutant replacement criteria above as consistent with 40 C.F.R. part 131. Since these new criteria address the same human health affects as the withdrawn criteria, EPA finds the criteria for the 13 pollutants identified above are not necessary to protect Oregon's fishing and water supply uses.

EPA Rationale

The CWA requires that, whenever a state or authorized tribe revises or adopts new WQS, it adopt criteria for all toxic pollutants listed pursuant to CWA § 307(a)(1) for which EPA has developed recommended criteria under CWA § 304(a), the discharge or presence of which in the affected waters could reasonably be expected to interfere with the adopted designated uses (CWA § 303(c)(2)(B)). As noted above, Oregon has refined the list of criteria for which it has established human health criteria to reflect recent science incorporated by EPA into the § 304(a)

[127] In addition, the following pollutant names were modified by ODEQ from their previous human health criteria for consistency with EPA terminology. These compounds are synonyms.

1. Dibutylphthalate was changed to Di-n-butyl Phthalate
2. Di-2-ethylhexyl phthalate was changed to Ethylhexyl phthalate bis 2
3. Hexachlorocyclohexane-alpha was changed to BHC alpha
4. Hexachlorocyclohexane-beta was changed to BHC beta
5. Hexachlorocyclohexane-gamma was changed to BHC gamma (Lindane)

human health criteria recommendations, including the removal of several pollutants representing chemical families and replacing them with criteria for more specific chemical compounds within the same general family. As such, the changes in the pollutant names listed above and the criteria adopted for these pollutants represent a refinement of criteria for individual chemicals within families, not withdrawals of criteria identified for pollutants in CWA § 307(a). Therefore, Oregon's withdrawal of its previous human health water quality criteria for these 13 pollutants is consistent with CWA § 303(c)(2)(B).

As stated above, Oregon's removal of these 13 pollutants and the associated criteria is consistent with EPA's removal of 304(a) criteria recommendations. Although the criteria for these 13 pollutants have been withdrawn, Oregon has developed individual criteria for the most toxic of chemicals in that family or retained the more specific criteria or a synonym for the chemical compounds. Therefore, while withdrawing the criteria for these 13 pollutants, Oregon has adopted new criteria to protect the same human health endpoints which these criteria were originally developed to protect. Therefore, EPA has determined that the withdrawal of these criteria coupled with the adoption of new criteria for similar pollutants (approved above in section IV.B) will protect Oregon's human health uses in accordance with 40 C.F.R. part 131.11(a)(1).

H. *TABLE 40 HUMAN HEALTH CRITERIA SUMMARY*

Oregon has added the following summary language prior to the human health criteria in Table 40 which explains the purpose of the criteria, criteria derivation and the format of the table.

TABLE 40: Human Health Water Quality Criteria for Toxic Pollutants

Human Health Criteria Summary
The concentration for each pollutant listed in Table 40 was derived to protect Oregonians from potential adverse health impacts associated with long-term exposure to toxic substances associated with consumption of fish, shellfish, and water. The "organism only" criteria are established to protect fish and shellfish consumption and apply to waters of the state designated for fishing. The "water + organism" criteria are established to protect the consumption of drinking water, fish, and shellfish, and apply where both fishing and domestic water supply (public and private) are designated uses. All criteria are expressed as micrograms per liter (µg/L), unless otherwise noted. Pollutants are listed in alphabetical order. Additional information includes the Chemical Abstract Service (CAS) number, whether the criterion is based on carcinogenic effects (can cause cancer in humans), and whether there is an aquatic life criterion for the pollutant (i.e. "y"= yes, "n" = no). All the human health criteria were calculated using a fish consumption rate of 175 grams per day unless otherwise noted. A fish consumption rate of 175 grams per day is approximately equal to 23 8-ounce fish meals per month. For pollutants categorized as carcinogens, values represent a cancer risk of one additional case of cancer in one million people (i.e. 10-6), unless otherwise noted. All metals criteria are for total metal concentration, unless otherwise noted. Italicized pollutants represent non-priority pollutants. The human health criteria revisions established by OAR 340-041-0033

and shown in Table 40 do not become applicable for purposes of ORS chapter 468B or the federal Clean Water Act until approved by EPA pursuant to 40 CFR 131.21 (4/27/2000).

Acknowledgement of Table 40 Summary Language

The new introductory summary language for Table 40 explains the purpose of the criteria, criteria derivation and the format of the table. However, this language does not establish a legally binding requirement under State law and it does not describe a desired ambient condition of a waterbody to support a particular designated use it is not considered a WQS subject to EPA review and approval under 303(c) of the CWA. EPA has addressed the new and revised underlying human health criteria in Table 40 and the narrative language at OAR 340-041-0033(4) in this technical support document. This summary language further explains how the state derived the criteria values in Table 40. EPA incorporated the explanatory information provided in this summary into its analysis of the individual criteria values in Table 40. But because this summary does not operate as an independent water quality standard, in isolation from the criteria values in Table 40 and the narrative language at OAR 340-041-0033(4) (which EPA acted on individually), EPA is taking no action to approve or disapprove this summary language.

V. NARRATIVE STATEMENT

Oregon's revisions to its narrative toxics provisions found at OAR 340-041-033(1), (3) and (4) are shown in underline/strikeout format below. Underlined text represents added text, while text with a line through the middle (strikeout) represents deleted text. Non-revised words are also provided below for context. Additionally, Oregon reorganized sections of OAR 340-041-0033, thus renumbering several of the provisions without substantively changing any of the regulatory language.

340-041-0033
Toxic Substances
(1) Amendments to sections (4) and (6) of this rule (OAR 340-041-0033) and associated revisions to Tables 20, 33A, 33B and 40 do not become applicable for purposes of ORS chapter 468B or the federal Clean Water Act unless and until EPA approves the provisions it identifies as water quality standards pursuant to 40 CFR 131.21 (4/27/2000).

(3) Aquatic Life Criteria. Levels of toxic substances in waters of the state may not exceed the applicable aquatic life criteria listed in Tables 20, 33A, and 33B. Tables 33A and 33B, adopted on May 20, 2004, update Table 20 as described in this section.

EPA Action
In accordance with its Clean Water Act authority, 33 U.S.C § 1313(c)(3) and 40 C.F.R. part 131, EPA approves the new and revised language at OAR 340-041-0033(1) and (3).

EPA Rationale
The new and revised provisions at OAR 340-041-0033(1) and (3) describe dates when the toxics criteria in Tables 20, 33A, 33B and 40 become effective under state law and the Clean Water Act. The effective date of WQS provisions under the CWA is determined by the date of EPA approval. These timing provisions are WQS that provide for the new and revised criteria to be immediately in effect at the time of EPA's approval action. EPA has addressed the new and revised underlying human health criteria in this technical support document. OAR 340-041-0033(3) clarifies that only aquatic life criteria remain in Tables 20, 33A and 33B. EPA will address the aquatic life criteria in these tables and their corresponding footnotes in a separate action.

(4) Human Health Criteria. The criteria for waters of the state listed in Table 40 are established to protect Oregonians from potential adverse health effects associated with long-term exposure to toxic substances associated with consumption of fish, shellfish, and water.

EPA Action
In accordance with its Clean Water Act authority, 33 U.S.C § 1313(c)(3) and 40 C.F.R. part 131, EPA approves the new language at OAR 340-041-0033(4).

EPA Rationale

The new provision at OAR 340-041-0033(4) adopts the human health criteria in Table 40. EPA approves this language which adopts the criteria and describes the intent of the criteria to protect human health uses in Oregon. This language explains the purpose of the human health criteria and describes that the criteria in Table 40 are established to protect Oregonians from potential adverse health effects association with long-term exposure to toxic substances associated with fish, shellfish and water consumption. EPA's action on each individual criterion in Table 40 is described in detail above.

VI. BACKGROUND POLLUTANT CRITERIA PROVISION

A. *BACKGROUND*

As previously discussed, in October 2008, the Oregon Environmental Quality Commission directed ODEQ to revise the State's human health criteria to incorporate a fish consumption rate of 175 grams per day. The fish consumption rate of 175 grams per day was selected by Oregon to ensure protection of all people in Oregon who may consume fish and shellfish from State waters including those who traditionally consume high amounts of fish for subsistence, health, economic or other reasons.[128] The rate reflects the 95th percentile of tribal members surveyed as part of the CRITFC Survey[129] and the 90th percentile of subsistence consumers surveyed in regional fish consumption studies. When providing this direction, the Commission also directed ODEQ to "propose rule language that would allow [O]DEQ to implement the standards in NPDES permits and other Clean Water Act programs in an environmentally meaningful and cost-effective manner" and to carefully consider the costs and benefits associated with elements of the new rule. This latter directive came following testimony from several stakeholders regarding potential implementation difficulties and economic burden of adopting the more stringent criteria.[130]

In response to this direction, ODEQ not only revised the human health criteria but also developed several new and revised rules addressing the implementation of the revised criteria. Each revised implementation rule targeted specific situations raised as potential concerns by ODEQ staff and stakeholders. The adoption of a new site-specific background pollutant criterion provision and the revisions to the variance provision (discussed in previous section) were submitted to EPA for action under Section 303(c) of the CWA while other rules were adopted pursuant to state law and were not submitted to EPA. All revisions are addressed separately in this document.

Oregon developed an *Issue Paper: Implementing Water Quality Standards for Toxic Pollutants in NPDES Permits, Human Health Toxics Rulemaking*[131] that discusses how ODEQ will implement the revised criteria in NPDES permits. Section IV.3 of this paper speaks directly to the site-specific background pollutant criterion provision and provides greater detail on its purpose, development and content as well as providing some discussion of how the resultant

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[128] ODEQ. October 6, 2008. *Memo from Dick Pederson, Director ODEQ, to the Environmental Quality Commission. Agenda Item G, Action Item: Oregon's Fish Consumption Rate – For Use in Setting Water Quality Standards for Toxic Pollutants October 23, 2008 EQC Meeting.* Oregon Department of Environmental Quality. page 7. Available at: http://www.deq.state.or.us/about/eqc/agendas/attachments/2008oct/ItemG.pdf

[129] Columbia River Inter-Tribal Fish Commission (CRITFC). October 1994. *A Fish Consumption Survey of the Umatilla, Nez Perce, Yakama, and Warm Springs Tribes of the Columbia River Basin.* Technical Report 94.3. Available at: http://www.critfc.org/tech/94-3report.pdf

[130] Oregon Environmental Quality Commission (OEQC). October 23, 2008. *Oregon Environmental Quality Commission Minutes of the Three Hundred and Forty-sixth Meeting.* Available at: http://www.deq.state.or.us/about/eqc/minutes/2008/2008octEQCMinutes.htm

[131] ODEQ. May 24, 2011. *Issue Paper: Implementing Water Quality Standards for Toxic Pollutants in NPDES Permits, Human Health Toxics Rulemaking.* Oregon Department of Environmental Quality. Available at: http://www.deq.state.or.us/wq/standards/docs/toxics/humanhealth/rulemaking/NPDESIssuePaper.pdf

criterion would be applied to NPDES permits.[132] Other issue papers were developed to address implementation of the criteria outside of the NPDES program including papers that address nonpoint sources, antidegradation and source control.[133]

One situation identified during the workgroup process as potentially problematic to dischargers as well as ODEQ when issuing NPDES permits as a result of the revised human health criteria is when a NPDES discharger takes in water from and discharges to the same waterbody, which contains pollutants from upstream sources over which the discharger has little to no control. ODEQ adopted an intake credit provision at OAR 340-045-0105 that does not hold facilities accountable for removing these upstream pollutants if the concentration of the pollutant does not exceed the water quality criteria, the facility does not chemically or physically modify the pollutant and several other conditions described in the rule are met.

However, facilities that concentrate pollutants in their discharge above the levels in the intake water are not eligible for the intake credit rule. For example, such an increase in concentration may occur when a facility's process involves evaporation (e.g. non-contact cooling water), and the facility recycles water, thus resulting in the same mass of the pollutant but a lower volume of water. If the upstream concentration of the pollutant in the waterbody exceeds the underlying criterion, a permit limit is established such that the criterion is met at the end of the discharge pipe and the facility would need to treat the water prior to discharge regardless of the upstream concentration.[134]

ODEQ discussed numerous options for addressing this type of situation with the objective for providing an approach that:

- protects human health;
- establishes reasonable implementation of the revised water quality standards for facilities in the situation described above;
- allocates limited State resources efficiently; and

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[132] ODEQ. May 24, 2011. *Issue Paper: Implementing Water Quality Standards for Toxic Pollutants in NPDES Permits, Human Health Toxics Rulemaking.* Oregon Department of Environmental Quality. Section IV.3, pages 44-61. Available at: http://www.deq.state.or.us/wq/standards/docs/toxics/humanhealth/rulemaking/NPDESIssuePaper.pdf

[133] ODEQ. May 26, 2011. *Issue Paper: Revisions to the Water Quality Standards and TMDL Rules (Divisions 41 and 42), Clarifications on How Nonpoint Sources Meet Water Quality Standards, Human Health Toxics Rulemaking.* Oregon Department of Environmental Quality. Available at: http://www.deq.state.or.us/wq/standards/docs/toxics/humanhealth/rulemaking/Div4142IssuePaper.pdf
ODEQ. December 29, 2010. *Issue Paper: Evaluating the Antidegradation Policy as a Means to Reduce Nonpoint Sources of Toxic Pollutants to Oregon Waters, Human Health Toxics Rulemaking.* Oregon Department of Environmental Quality. Available at: http://www.deq.state.or.us/wq/standards/docs/toxics/humanhealth/rulemaking/AntidegIssuePaper.pdf
ODEQ. December 29, 2010. *Issue Paper: Source Control Small Group, Human Health Toxics Rulemaking.* Oregon Department of Environmental Quality. Available at: http://www.deq.state.or.us/wq/standards/docs/toxics/humanhealth/rulemaking/SourceControlIssuePaper.pdf

[134] ODEQ. April 20, 2010. *Implementing Water Quality Standards for Toxic Pollutants in Clean Water Act Permits.* DRAFT. RWG April 27, 2010 Discussion. Oregon Department of Environmental Quality. page 6. Available at: http://www.deq.state.or.us/wq/standards/docs/toxics/humanhealth/BackgroundPollutantsIssuePaper20110427.pdf

- ensures that regulatory requirements and costs for a facility are commensurate with the environmental threat they pose.[135]

Oregon proposed a draft rule and accepted public comment on that rule during the public process described above for all other elements of this action submitted by Oregon on July 21, 2011. In EPA's public comments to ODEQ on March 21, 2011 regarding the previous version of the background pollutant criteria provision proposed for public comment, EPA stated that ODEQ could:

- Implement the criterion on a site specific basis and submit each application to EPA for evaluation on a case by case basis; or
- Revise the provision consistent with a performance-based approach as a viable alternative to submitting each revision to EPA on a site specific basis. If ODEQ were to choose this option, sufficiently detailed implementation procedures would need to be adopted directly into the WQS regulations which establish a framework that is binding, clear, predictable and transparent.

Following consideration of the comments received, ODEQ adopted a performance-based water quality standard that can be used to adopt site-specific criteria for human health carcinogens where all of the following conditions apply:

- The criterion at issue is a human health criterion, for a pollutant identified as a carcinogen.
- The discharge does not increase the mass load of the pollutant in the receiving water. The mass load of the pollutant discharged to a waterbody may not exceed the mass load of the pollutant taken in from the same waterbody or a hydrologically connected water.
- The pollutant concentration in the receiving water is not increased by more than 3% above the upstream ambient concentration.
- The water body concentration does not exceed a calculated value that represents the human health criterion calculated at a risk level of 10^{-4}.
- The discharger uses any feasible pollutant reduction measures known and available to minimize the pollutant concentration in their discharge.
- The criterion must be evaluated and revised, if appropriate, when the permit is reissued.
- No TMDL has been developed for the waterbody and pollutant at issue.[136]

The provision authorizes ODEQ to develop a site-specific criterion for the waterbody in the vicinity of a discharge and use that criterion to develop an effluent limit for the pollutant if all conditions of the rule are met. The criterion established would be based upon the most stringent of 1) the instream concentration following receipt of the current level of discharge from the

[135] ODEQ. May 24, 2011. *Issue Paper: Implementing Water Quality Standards for Toxic Pollutants in NPDES Permits, Human Health Toxics Rulemaking.* Oregon Department of Environmental Quality. pages 45-46. Available at: http://www.deq.state.or.us/wq/standards/docs/toxics/humanhealth/rulemaking/NPDESIssuePaper.pdf
[136] ODEQ. May 24, 2011. *Issue Paper: Implementing Water Quality Standards for Toxic Pollutants in NPDES Permits, Human Health Toxics Rulemaking.* Oregon Department of Environmental Quality. pages 44-45. Available at: http://www.deq.state.or.us/wq/standards/docs/toxics/humanhealth/rulemaking/NPDESIssuePaper.pdf

facility, 2) a 3% increase in the ambient instream concentration of the pollutant, or 3) a concentration value that represents a 1×10^{-4} risk level. In addition, the criterion could not be established at a level that would allow the facility to increase the mass load of the pollutant from that in their intake water.[137]

A site-specific background pollutant criterion may only be developed under this provision if the waterbody serves as the receiving water for a NPDES discharge and the effluent discharged meets certain requirements. Oregon's rule limits the criteria developed under this rule by requiring the criteria be established at the most stringent of several options that are based on applying certain limitations on the effluent from the facility and on the resultant instream criteria. Therefore, the process outlined in Oregon's rule uses the same type of calculations made in establishing NPDES permit limits to calculate the resultant instream concentration at various effluent conditions. Once a site-specific criterion is adopted, it is to be used to develop permit effluent limits in the same manner as any other criteria.[138]

In order to provide further guidance to their permit writers ODEQ will be developing an Internal Management Directive (IMD) within 180 days of EPA's approval action.[139] This is one of several items identified by ODEQ as actions necessary to assist ODEQ staff and the public in implementing the provisions approved in this action.

B. *ODEQ'S JULY 21, 2011 SUBMITTAL*

ODEQ has added a new provision which establishes a site-specific background pollutant criteria at OAR 340-041-0033(6). This provision is a performance-based water quality standard that results in site-specific human health water quality criteria under the conditions and procedures specified within the rule. It addresses existing permitted discharges of a pollutant removed from the same body of water, as defined in the provision.

Below is Oregon's background pollutant criteria provision, found at OAR 340-041-0033(6).

340-041-0033(6)

Establishing Site-Specific Background Pollutant Criteria: This provision is a performance-based water quality standard that results in site-specific human health water quality criteria under the conditions and procedures specified in this rule section. It addresses existing permitted discharges of a pollutant

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[137] ODEQ. May 24, 2011. *Issue Paper: Implementing Water Quality Standards for Toxic Pollutants in NPDES Permits, Human Health Toxics Rulemaking.* Oregon Department of Environmental Quality. page 44. Available at: http://www.deq.state.or.us/wq/standards/docs/toxics/humanhealth/rulemaking/NPDESIssuePaper.pdf
[138] ODEQ. May 24, 2011. *Issue Paper: Implementing Water Quality Standards for Toxic Pollutants in NPDES Permits, Human Health Toxics Rulemaking.* Oregon Department of Environmental Quality. page 60. Available at: http://www.deq.state.or.us/wq/standards/docs/toxics/humanhealth/rulemaking/NPDESIssuePaper.pdf
[139] ODEQ. June 2, 2011. Memorandum from Dick Pedersen to Environmental Quality Commission; *Agenda item C, Rule adoption: Revised water quality standards for human health and revised water quality standards implementation policies,* June 15-17, EQC meeting. Oregon Department of Environmental Quality. Supplemental Attachment 10, Timeline for Follow-Up Actions, WQS for Human Health Toxic Pollutants Rulemaking.

removed from the same body of water. For waterbodies where a discharge does not increase the pollutant's mass and does not increase the pollutant concentration by more than 3%, and where the water body meets a pollutant concentration associated with a risk level of $1x10^{-4}$, DEQ concludes that the pollutant concentration continues to protect human health.

(a) Definitions: For the purpose of this section [OAR 340-041-0033(6)]:

> *(A) "Background pollutant concentration" means the ambient water body concentration immediately upstream of the discharge, regardless of whether those pollutants are natural or result from upstream human activity.*
>
> *(B) An "intake pollutant" is the amount of a pollutant that is present in public waters (including groundwater) as provided in subsection (C), below, at the time it is withdrawn from such waters by the discharger or other facility supplying the discharger with intake water.*
>
> *(C) "Same body of water": An intake pollutant is considered to be from the "same body of water" as the discharge if the department finds that the intake pollutant would have reached the vicinity of the outfall point in the receiving water within a reasonable period had it not been removed by the permittee. This finding may be deemed established if:*
>
> > *(i) The background concentration of the pollutant in the receiving water (excluding any amount of the pollutant in the facility's discharge) is similar to that in the intake water;*
> >
> > *(ii) There is a direct hydrological connection between the intake and discharge points; and*
> >
> > > *(I) The department may also consider other site-specific factors relevant to the transport and fate of the pollutant to make the finding in a particular case that a pollutant would or would not have reached the vicinity of the outfall point in the receiving water within a reasonable period had it not been removed by the permittee.*
> > >
> > > *(II) An intake pollutant from groundwater may be considered to be from the "same body of water" if the department determines that the pollutant would have reached the vicinity of the outfall point in the receiving water within a reasonable period had it not been removed by the permittee, except that such a pollutant is not from the same body of water if the groundwater contains the pollutant partially or entirely due to past or present human activity, such as industrial, commercial, or municipal operations, disposal actions, or treatment processes.*
> >
> > *(iii) Water quality characteristics (e.g., temperature, pH, hardness) are similar in the intake and receiving waters.*

(b) Applicability

> *(A) Site-specific criteria may be established under this rule section only for carcinogenic pollutants.*
>
> *(B) Site-specific criteria established under this rule section apply in the vicinity of the discharge*

for purposes of establishing permit limits for the specified permittee.
(C) The underlying waterbody criteria continue to apply for all other Clean Water Act programs.

(D) The site-specific background pollutant criterion will be effective upon department issuance of the permit for the specified permittee.

(E) Any site-specific criteria developed under this procedure will be re-evaluated upon permit renewal.

(c) A site-specific background pollutant criterion may be established where all of the following conditions are met:

(A) The discharger has a currently effective NPDES permit;

(B) The mass of the pollutant discharged to the receiving waterbody does not exceed the mass of the intake pollutant from the same body of water, as defined in section 6(a)(C) above, and, therefore, does not increase the total mass load of the pollutant in the receiving water body;

(C) The discharger has not been assigned a TMDL wasteload allocation for the pollutant in question;

(D) The permittee uses any feasible pollutant reduction measures available and known to minimize the pollutant concentration in their discharge;

(E) The pollutant discharge has not been chemically or physically altered in a manner that causes adverse water quality impacts that would not occur if the intake pollutants were left in-stream; and,

(F) The timing and location of the pollutant discharge would not cause adverse water quality impacts that would not occur if the intake pollutant were left in-stream.

(d) The site-specific background pollutant criterion must be the most conservative of the following four values. The procedures deriving these values are described in the sections (6)(e) of this rule.

(A) The projected in-stream pollutant concentration resulting from the current discharge concentration and any feasible pollutant reduction measures under (c)(D) above, after mixing with the receiving stream.

(B) The projected in-stream pollutant concentration resulting from the portion of the current discharge concentration associated with the intake pollutant mass after mixing with the receiving stream. This analysis ensures that there will be no increase in the mass of the intake pollutant in the receiving water body as required by condition (c)(B) above.

(C) The projected in-stream pollutant concentration associated with a 3% increase above the background pollutant concentration as calculated:

(i) For the mainstem Willamette and Columbia Rivers, using 25% of the harmonic mean flow of the waterbody.

(ii) For all other waters, using 100% of the harmonic mean flow or similar critical flow

value of the waterbody.

(D) A criterion concentration value representing a human health risk level of 1×10^{-4}. This value is calculated using EPA's human health criteria derivation equation for carcinogens (EPA 2000), a risk level of 1×10^{-4}, and the same values for the remaining calculation variables that were used to derive the underlying human health criterion.

(e) Procedure to derive a site-specific human health water quality criterion to address a background pollutant:

(A) The department will develop a flow-weighted characterization of the relevant flows and pollutant concentrations of the receiving waterbody, effluent and all facility intake pollutant sources to determine the fate and transport of the pollutant mass.

(i) The pollutant mass in the effluent discharged to a receiving waterbody may not exceed the mass of the intake pollutant from the same body of water.

(ii) Where a facility discharges intake pollutants from multiple sources that originate from the receiving waterbody and from other waterbodies, the department will calculate the flow-weighted amount of each source of the pollutant in the characterization.

(iii) Where intake water for a facility is provided by a municipal water supply system and the supplier provides treatment of the raw water that removes an intake water pollutant, the concentration and mass of the intake water pollutant shall be determined at the point where the water enters the water supplier's distribution system.

(B) Using the flow weighted characterization developed in Section (6)(e)(A), the department will calculate the in-stream pollutant concentration following mixing of the discharge into the receiving water. The resultant concentration will be used to determine the conditions in Section (6)(d)(A) and (B).

(C) Using the flow weighted characterization, the department will calculate the in-stream pollutant concentration based on an increase of 3% above background pollutant concentration. The resultant concentration will be used to determine the condition in Section (6)(d)(C).

(i) For the mainstem Willamette and Columbia Rivers, 25% of the harmonic mean flow of the waterbody will be used.

(ii) For all other waters, 100% of the harmonic mean flow or similar critical flow value of the waterbody will be used.

(D) The department will select the most conservative of the following values as the site-specific water quality criterion.

(i) The projected in-stream pollutant concentration described in Section 6(e)(B);

(ii) The in-stream pollutant concentration based on an increase of 3% above background described in Section 6(e)(C); or

(iii) A water quality criterion based on a risk level of 1×10^{-4}.

(f) Calculation of water quality based effluent limits based on a site-specific background pollutant criterion:

> *(A) For discharges to receiving waters with a site-specific background pollutant criterion, the department will use the site-specific criterion in the calculation of a numeric water quality based effluent limit.*
>
> *(B) The department will compare the calculated water quality based effluent limits to any applicable aquatic toxicity or technology based effluent limits and select the most conservative for inclusion in the permit conditions.*

(g) In addition to the water quality based effluent limits described in Section (6)(f), the department will calculate a mass-based limit where necessary to ensure that the condition described in Section (6)(c)(B) is met. Where mass-based limits are included, the permit shall specify how compliance with mass-based effluent limitations will be assessed.

(h) The permit shall include a provision requiring the department to consider the re-opening of the permit and reevaluation of the site-specific background pollutant criterion if new information shows the discharger no longer meets the conditions described in subsections (6)(c) and (e).

(i) Public Notification Requirements.

> *(A) If the department proposes to grant a site-specific background pollutant criterion, it must provide public notice of the proposal and hold a public hearing. The public notice may be included in the public notification of a draft NPDES permit or other draft regulatory decision that would rely on the criterion and will also be published on the water quality standards website;*
>
> *(B) The department will publish a list of all site-specific background pollutant criteria approved pursuant to this rule. A criterion will be added to this list within 30 days of its effective date. The list will identify: the permittee; the site-specific background pollutant criterion and the associated risk level; the waterbody to which the criterion applies; the allowable pollutant effluent limit; and how to obtain additional information about the criterion.*

C. *EPA ACTION ON ODEQ'S NEW BACKGROUND POLLUTANT CRITERIA PROVISION*

EPA Action

In accordance with its CWA authority, 33 U.S.C § 1313(c)(3) and 40 C.F.R. part 131, EPA approves Oregon's new background pollutant criteria provision at OAR 340-041-0033(6), as detailed below, because it is consistent with the Clean Water Act and the implementing Federal water quality standards regulations governing EPA's review and approval or disapproval of new or revised water quality standards as required in 40 C.F.R. part 131. In EPA's review of Oregon's background pollutant criteria provision, the Agency considered information submitted on July 21, 2011 including ODEQ's NPDES Implementation Issue Paper[140] and Response to

[140] ODEQ. May 24, 2011. *Issue Paper: Implementing Water Quality Standards for Toxic Pollutants in NPDES Permits, Human Health Toxics Rulemaking.* Oregon Department of Environmental Quality. Available at:

Comments document.[141]

In its review and action on the background pollutant provision, EPA also considered the following three key elements:

- Whether the site-specific human health criteria to be generated under the provision are sufficient to protect Oregon's human health uses, as required under 40 CFR 131.6.
- Whether the site-specific human health criteria to be generated under the provision are consistent with EPA's regulatory specifications for criteria at 40 CFR 131.11.
- Whether this implementation procedure contains sufficient detail, and suitable safeguards, such that additional § 303(c) review of individual criteria generated under the provision would be redundant.

As described in further detail below, EPA has concluded that the site-specific background pollutant provision adequately addresses all three of these elements and thus is consistent with CWA § 303(c) and its implementing regulations.

EPA Rationale

The provision establishes site-specific human health criteria at a level to protect Oregon's human health uses

Oregon's site-specific background pollutant provision contains a binding restriction that any site-specific criterion to be generated under the provision must be established at the most conservative (stringent) of the conditions specified in OAR 340-041-033(6)(d) and reflect no net addition of the pollutant from the discharger to the waterbody segment. In no case may a criterion developed under this provision represent a carcinogenic human health risk level greater than 1.0 $x10^{-4}$, however, it may be more stringent. Since the least stringent scenario for a site-specific criterion generated under the provision (i.e., one generated based on a 10^{-4} risk level) is itself within EPA's recommended range of risk levels protective of human health designated uses, EPA concludes that a criterion developed using Oregon's site-specific background pollutant provision would be protective of Oregon's human health uses.

EPA's Human Health Methodology recognizes that States and Tribes have discretion in selecting appropriate risk ranges and recommends that states adopt criteria for carcinogens based on either a 1×10^{-6} or 1×10^{-5} risk level to protect the general population, as long as highly exposed populations do not exceed a 1×10^{-4} risk level.[142] Consistent with the flexibility accorded to States in developing risk ranges for carcinogenic pollutants, Oregon has chosen to exercise this discretion by allowing the risk level for carcinogens in waters in the vicinity of certain NPDES discharges not to exceed 10^{-4}. As discussed previously, Oregon used a fish consumption rate reflective of highly exposed consumers and a risk level of 1×10^{-6} for deriving their human

http://www.deq.state.or.us/wq/standards/docs/toxics/humanhealth/rulemaking/NPDESIssuePaper.pdf

[141] ODEQ. May 2011. *Response to Comments: Proposed Water Quality Standards for Human Health and Water Quality Standards Implementation Policies.* Oregon Department of Environmental Quality. page 21. Available at: http://www.deq.state.or.us/wq/standards/docs/toxics/humanhealth/rulemaking/ResponseToComments.pdf

[142] EPA. 2000. *Methodology for Deriving Ambient Water Quality Criteria for the Protection of Human Health*. U.S. Environmental Protection Agency, Office of Water, EPA-822-B-00-004. page 2-6. Available at: http://www.epa.gov/waterscience/criteria/humanhealth/method/complete.pdf

health criteria. In this case, the site specific criteria would continue to protect the highly exposed consumer but at a risk level between 1×10^{-6} and 1×10^{-4}. Thus, EPA concludes that any site-specific criterion calculated based on a 1×10^{-4} risk level would be consistent with EPA's guidance with respect to highly exposed populations, since the fish consumption rate already reflects highly exposed populations. EPA has recommended using a fish consumption rate for the general US population of 17.5 grams per day if no local or regional data is available. There is currently no available fish consumption data specific to the general population of Oregon. If one were to evaluate the protectiveness of a site-specific criterion developed under this provision at a 10^{-4} risk level but using EPA's default fish consumption rate of 17.5 grams per day, the result would protect at a carcinogenic risk level of 1×10^{-5}. This risk level is consistent with that recommended by EPA by EPA in the 2000 Human Health Methodology. Therefore, EPA finds that criteria established under this provision would be established at a level protective of both the general population and high fish consuming populations consistent with the levels recommended by EPA in the 2000 Human Health Methodology.

In response to several comments regarding the use of a 1×10^{-4} risk level, ODEQ affirmed that the criterion would be established at "the <u>most protective of the following</u> results: the current ambient pollutant concentration after discharge; the background concentration plus three percent; or the <u>criteria value calculated at a 1×10^{-4} risk level</u>" (emphasis added)).[143] In several other responses to comments as well as at several places in the Issue Paper, ODEQ has also stated that a 1×10^{-4} risk would be the greatest possible risk allowed under the criterion and that other conditions within the provision would often limit the criterion further.[144] ODEQ also specifies this fact in their July 21, 2011 letter to EPA requesting the review and approval of these rules.[145] In ODEQ's response to comments, they explained why they found this additional level of risk to be protective in this site-specific situation. They note that several restrictions have been included in the rule in order to limit any additional risk to the human health use.

- First, the rule requires that the pollutant be from the "same body of water" and that the mass of the pollutant associated with the facility may not be increased from its intake water to the effluent water. These requirements ensure that any discharge limits based on the site specific criterion would not add any additional mass to the waterbody, although the discharger may slightly increase the pollutant concentration relative to background (up to a maximum of three percent). In other words, the pollutant present in the

[143] ODEQ. May 2011. *Response to Comments: Proposed Water Quality Standards for Human Health and Water Quality Standards Implementation Policies.* Oregon Department of Environmental Quality. page 54. Available at: http://www.deq.state.or.us/wq/standards/docs/toxics/humanhealth/rulemaking/ResponseToComments.pdf
[144] ODEQ. May 2011. *Response to Comments: Proposed Water Quality Standards for Human Health and Water Quality Standards Implementation Policies.* Oregon Department of Environmental Quality. pages 49; 55-58. Available at:
http://www.deq.state.or.us/wq/standards/docs/toxics/humanhealth/rulemaking/ResponseToComments.pdf
ODEQ. May 24, 2011. *Issue Paper: Implementing Water Quality Standards for Toxic Pollutants in NPDES Permits, Human Health Toxics Rulemaking.* Oregon Department of Environmental Quality. pages 47; 49; 50; 58. Available at: http://www.deq.state.or.us/wq/standards/docs/toxics/humanhealth/rulemaking/NPDESIssuePaper.pdf
[145] ODEQ. July 21, 2011. Letter from Neil Mullane, Water Quality Division Administrator, to Michael Bussell, Office of Water and Watersheds, EPA Region 10. *Re: Oregon Submission of Revised State Water Quality Standards for Toxic Pollutants, Including a New Background Pollutant Provision and a Revised Variance Rule for EPA Review and Approval.*

waterbody segment to which the criteria will apply would have reached the vicinity of the outfall point had it not been intercepted by the discharger and there is no addition of pollutants by the facility.[146]

- Second, the application of the criterion is limited to the sole purpose of accommodating existing discharges from an existing NPDES discharger. In no case could a criterion decrease in stringency such that the current discharge concentration to a water body would be allowed to increase as a result of the revision.[147]
- Third, the underlying water quality criterion will remain in effect for all other CWA purposes including 303(d) listing and TMDL development. (as explained above)
- Finally, the rule requires that the criterion be re-evaluated upon permit renewal (OAR 340-041-0033(6)(b)(E)), thus making the criterion effective only for the duration of the permit and requiring that the site-specific criterion be reevaluated and revised, if appropriate, upon permit renewal using current ambient and effluent data in situations where all the prerequisite conditions continue to be present.[148] As noted above, if a TMDL was established prior to this renewal, a site-specific criterion could not be obtained under this rule and the facility's effluent limit must be consistent with the WLA in the TMDL.

ODEQ therefore determined that the relative increase in ambient concentration does not result in a significant change to human health risk[149] and that the criterion developed under this provision would be protective of the beneficial uses of that waterbody.[150]

Since this provision establishes a process for developing individual site-specific criteria, the exact location of each application cannot be specified in advance. However, the provision does specify criteria location relative to the pertinent discharger ("in the vicinity of the discharge for purposes of establishing permit limits for the specified permittee"). (OAR 340-041-0033(6)(b)). Thus, dischargers other than the specified permittee would not be able to use the site-specific criterion in permit calculations.[151] For the specified permitee, a site-specific criterion

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[146] ODEQ. May 2011. *Response to Comments: Proposed Water Quality Standards for Human Health and Water Quality Standards Implementation Policies.* Oregon Department of Environmental Quality. page 51. Available at: http://www.deq.state.or.us/wq/standards/docs/toxics/humanhealth/rulemaking/ResponseToComments.pdf

[147] OAR 340-041-0033(6)(d)(A) and (B)
ODEQ. May 24, 2011. *Issue Paper: Implementing Water Quality Standards for Toxic Pollutants in NPDES Permits, Human Health Toxics Rulemaking.* Oregon Department of Environmental Quality. page 44. Available at: http://www.deq.state.or.us/wq/standards/docs/toxics/humanhealth/rulemaking/NPDESIssuePaper.pdf

[148] ODEQ. May 2011. *Response to Comments: Proposed Water Quality Standards for Human Health and Water Quality Standards Implementation Policies.* Oregon Department of Environmental Quality. page 60. Available at: http://www.deq.state.or.us/wq/standards/docs/toxics/humanhealth/rulemaking/ResponseToComments.pdf

[149] ODEQ. May 24, 2011. *Issue Paper: Implementing Water Quality Standards for Toxic Pollutants in NPDES Permits, Human Health Toxics Rulemaking.* Oregon Department of Environmental Quality. page 44. Available at: http://www.deq.state.or.us/wq/standards/docs/toxics/humanhealth/rulemaking/NPDESIssuePaper.pdf

[150] ODEQ. May 2011. *Response to Comments: Proposed Water Quality Standards for Human Health and Water Quality Standards Implementation Policies.* Oregon Department of Environmental Quality. page 65. Available at: http://www.deq.state.or.us/wq/standards/docs/toxics/humanhealth/rulemaking/ResponseToComments.pdf

[151] ODEQ. May 24, 2011. *Issue Paper: Implementing Water Quality Standards for Toxic Pollutants in NPDES Permits, Human Health Toxics Rulemaking.* Oregon Department of Environmental Quality. page 44. Available at: http://www.deq.state.or.us/wq/standards/docs/toxics/humanhealth/rulemaking/NPDESIssuePaper.pdf
ODEQ. May 2011. *Response to Comments: Proposed Water Quality Standards for Human Health and Water*

corresponding to a risk level of 1 x 10^{-4} or safer would be applicable to the water in the vicinity of the discharge.[152] Since the site-specific conditions are themselves predicated on the characteristics of the discharger, an appropriate matching of the criterion to discharger is an adequate specification of where the site-specific criteria will apply.

EPA notes that one commenter was concerned that the approach in the proposed rule introduced an inconsistency into Oregon's water quality criteria. The commenter questioned whether it was consistent with the Clean Water Act for Oregon to determine that a single risk target is both protective (where site-specific criteria apply) and non-protective (where site-specific criteria do not apply) of human health uses. ODEQ addressed this comment by adding additional detail in the final rule. In addition, EPA evaluated this concern relative to the final rule in light of the fact that Oregon already had the discretion, consistent with EPA's Human Health Methodology, to adopt criteria based on a risk range between 1 x 10^{-6} and 1 x 10^{-4} (in conjunction with a fish consumption rate that reflects high-consuming populations). If Oregon had adopted state-wide criteria reflecting a risk range less stringent than 1 x 10^{-6}, Oregon could have exercised its discretion, based on its own policy priorities and consistent with CWA § 510, to apply *more stringent* site-specific criteria where it deemed appropriate. Under these circumstances, a single risk target would be both protective (where site-specific criteria do not apply) and non-protective (where site-specific criteria apply). The only practical distinction between this scenario and the one raised in public comments is which risk level is treated as the normative baseline, and which is treated as site-specific departure from the baseline.

Since multiple risk levels for carcinogenic pollutants are within the range identified as acceptable in EPA's Human Health Methodology, and States/Tribes have the ability to define "local conditions" when establishing site specific criteria, EPA concludes that Oregon has discretion to apply both one risk level as a generally applicable value and other risk levels on a site-specific basis (i.e., as "site-specific conditions" under 40 CFR 131.11(b)). While the target risk level is combined with other values (based on a scientific rationale) to generate a criterion value for a carcinogenic pollutant, site-specific variation in the target risk level itself is based on Oregon's risk management judgment. In order for the overall site-specific criterion to be "based on sound scientific rationale," under 40 CFR 131.11(a)(1), it is sufficient that Oregon has clearly identified the rationale for the site-specific criteria as a policy decision within its discretion and consistent with EPA's Human Health Methodology.

EPA also notes that one commenter expressed concern about the interaction between the proposed background pollutant provision and Oregon's existing mixing zone policy. EPA acknowledges that, as with other Oregon criteria, the site specific criteria generated under the background pollutant provision would be used in developing water quality based effluent limits for the NPDES permit discharging to the waterbody. EPA also acknowledges that, in certain instances, Oregon's current mixing zone policy may be applied when developing such limits. In

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Quality Standards Implementation Policies. Oregon Department of Environmental Quality. page 56. Available at: http://www.deq.state.or.us/wq/standards/docs/toxics/humanhealth/rulemaking/ResponseToComments.pdf

[152] As discussed below, Oregon's existing mixing zone policy would still affect the calculation of effluent limits based on the criterion. Nevertheless, the applicable criterion in the receiving water is constrained, by OAR 340-041-0033(6)(D), to be at least as stringent as the value calculated based on a risk level of 1x10^{-4}.

the Issue Paper ODEQ states that once the site-specific background pollutant criterion has been determined, the criterion will be used to establish a numeric permit effluent limit using the same procedures and guidance used for establishing permit limits for any human health criteria.[153] Furthermore, ODEQ's response to comments specifies that any mixing will be determined based on the guidance provided in [O]DEQ's Reasonable Potential Internal Management Directive (IMD) and that [O]DEQ's published guidelines (Regulated Mixing Zones IMD) would govern the siting and sizing of any zones of mixing.[154] Any mixing zone allowed would be required under the CWA to comply with the all requirements of the State's mixing zone provision prior to a mixing zone being authorized. In certain circumstances it is possible that a mixing zone for a site-specific criterion generated under this provision (or any other human health criterion for a carcinogen) may allow a limited area of the waterbody in which the cancer risk associated with the pollutant concentration would exceed 1×10^{-4}. However, EPA does not therefore conclude that the criterion is inconsistent with its Human Health Methodology. The potential for criteria to be implemented in concert with an EPA-approved state mixing zone policy is a background assumption of EPA's Human Health Methodology, not an additional factor that would weigh in favor of further limiting states' risk management discretion.

Furthermore, the language of OAR 340-041-0033(6)(d)(A) and (B) that speaks to the projected instream concentration "after mixing with the receiving stream" addresses the calculation of a projected instream value under specified effluent conditions. It does not establish a new mixing zone policy. EPA finds it appropriate that ODEQ utilize calculations similar to those used to develop permits when projecting this instream value as this allows the results of applying limitations to the effluent to be expressed as an insteam concentration and thus to be directly compared to the options limited by instream concentration. Furthermore, it provides that, for purposes of the stringency analysis, all options are expressed in the same units as the final criterion value. A similar practice is commonly used when EPA and States determine whether a discharge needs a water quality based effluent limit (see, e.g., 40 CFR 122.44(d)(1)(ii) "When determining whether a discharge causes, has the reasonable potential to cause, or contributes to an in-stream excursion above a narrative or numeric water quality standard, the permitting authority shall use procedures which account for … where appropriate, <u>the dilution of the effluent</u> in the receiving water." (emphasis added)).

EPA considered whether implementation of the background pollutant provision is consistent

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[153] ODEQ. May 24, 2011. *Issue Paper: Implementing Water Quality Standards for Toxic Pollutants in NPDES Permits, Human Health Toxics Rulemaking.* Oregon Department of Environmental Quality. page 60. Available at: http://www.deq.state.or.us/wq/standards/docs/toxics/humanhealth/rulemaking/NPDESIssuePaper.pdf

[154] ODEQ. May 2011. *Response to Comments: Proposed Water Quality Standards for Human Health and Water Quality Standards Implementation Policies.* Oregon Department of Environmental Quality. page 55. Available at: http://www.deq.state.or.us/wq/standards/docs/toxics/humanhealth/rulemaking/ResponseToComments.pdf
ODEQ. August 2011. *Internal Management Directive: Reasonable Potential Analysis Process for Toxic Pollutants, Version 3.0. Oregon Department of Environmental Quality.* Available at: http://www.deq.state.or.us/wq/pubs/imds/rpaIMD.pdf
ODEQ. December 2007. Oregon Department of Environmental Quality. *Regulatory Mixing Zone Internal Management Directive. Part 1: Allocating Regulatory Mixing Zones.* Available at: http://www.deq.state.or.us/wq/pubs/imds/rmz/RMZIMDpart1.pdf and *Regulatory Mixing Zone Internal Management Directive. Part 2: Reviewing Mixing Zone Studies.* Available at: http://www.deq.state.or.us/wq/pubs/imds/rmz/RMZIMDpart2.pdf

with the requirements of 40 CFR 131.10. For the following reasons, EPA concludes that it is. Oregon has expressly stated that a criterion based on a higher risk level, established pursuant to the provision, "continues to protect human health." OAR 340-041-0033(6). Thus, the background pollutant provision does not represent the revision of a human health use, but rather the articulation (within the range of the state's discretion) of the risk range the State considers protective of human health uses in this site-specific situation. The revision of criteria within the State's range of discretion for a designated use does not represent the removal or impairment of such a designated use. In conclusion, the provision contains a clear, predictable and transparent restriction that any site-specific criterion to be generated under the background pollutant provision must not correspond to a human health risk level of less stringent than 1×10^{-4}.[155] This minimum risk level is the most critical of the restrictions contained in the provision since it sets the least stringent criterion possible under the procedure. The least stringent criterion possible under the procedure is protective of Oregon's human health uses and is consistent with EPA's Human Health Methodology. Thus, EPA's approval of the provision may also serve as the Clean Water Act § 303(c)(3) approval of the individual site-specific criteria to be generated under the provision.

The provision generates site-specific human health criteria consistent with 40 CFR 131.11
EPA's regulations at 40 CFR 131.11 require States to adopt water quality criteria that protect the designated use and must be that are based on sound scientific rationale. It also allows States to modify criteria in order to reflect site-specific situations.[156] In OAR 340-041-0033(6) Oregon establishes a procedure to develop a site-specific human health criterion for carcinogens in a limited number of site-specific situations when developed consistent with the procedures specified in the rule.

Oregon has restricted the use of the site-specific background pollutant criteria provision to waterbodies where an existing NPDES discharger withdraws water from a waterbody and returns it to the same waterbody without adding any mass to the pollutant of concern. It is further limited to carcinogenic pollutants[157] and utilizes information about the discharge to limit the criterion. The rule provides a structured framework for developing a site-specific criterion which is limited by a number of factors, including a requirement that the criterion never exceed a criterion calculated at a 1×10^{-4} risk level. Further limitations are derived based on the pre-existing quantity and quality of the discharge into the receiving water, no greater than a three percent increase in instream concentration and no increase in mass load of the pollutant from the discharger. In no case will the criteria allow greater than a 10^{-4} carcinogenic risk level (as established using the same methodology used for all other human health criteria addressed in this action).

EPA has reviewed whether Oregon had supplied appropriate grounds to derive a site-specific human health criterion for carcinogens, consistent with 40 CFR 131.11. EPA's water quality standards regulations provide that water quality criteria "must be based on sound scientific

[155] OAR 340-041-0033(6)(d)
[156] 40 CFR 131.11 (A)(1); 40 CFR 131.11(b)(1)(ii)
[157] OAR 340-041-0033(6)(b)(A)

rationale,"[158] and contemplate that a State may adopt site-specific criteria, and provide that these site-specific criteria "should . . . reflect site-specific conditions."[159] EPA's Human Health Methodology further clarifies a State's flexibility to derive site-specific criteria for human health criteria. Human health criteria may be modified to reflect, in a justifiable manner, "local environmental conditions." Local conditions may be those which prevail over a particular river reach, an entire river, regionally, or Statewide.[160] In other guidance, EPA has acknowledged that *less stringent* site specific modifications to human health criteria may be appropriate (in that case, either based on local variation in fish consumption rates or applicable bioaccumulation factors).[161] Thus, EPA finds that the criteria are based on a sound scientific rationale, will reflect site-specific conditions and, as discussed above, are established at a level that will protect Oregon's human health uses.

The provision establishes site-specific human health criteria using the performance-based criterion approach

Finally, EPA reviewed whether the background pollutant provision contains sufficient detail, and suitable safeguards, that EPA's approval of the provision may also serve as the Clean Water Act § 303(c)(3) approval of the individual site-specific criteria to be generated under the provision**.**

EPA's water quality standard regulations at 40 CFR 131.21 provide that a state water quality standard adopted after May 30, 2000 is not applicable for Clean Water Act purposes until "EPA approves that water quality standard [under § 303(c)(3) of the CWA]." However, when EPA promulgated this regulation it made clear that states have the option to streamline this process by pursuing a "performance-based" approach whereby the state adopts a "process (i.e., a criterion derivation methodology) rather than a specific outcome (i.e., concentration limit for a pollutant) consistent with 40 CFR 131.11 and 131.13."[162] Under the performance-based approach, EPA conducts a CWA § 303(c)(3) review of the procedure and the criteria that would be generated under that procedure. EPA approval of the provision can encompass approval of the individual criteria to be generated under the provision where the procedure is "sufficiently detailed and has suitable safeguards to ensure predictable and repeatable outcomes." To this end, the procedure should establish a "structure or decision-making framework that is binding, clear, predictable, and transparent." [163] EPA further specified that the performance-based approach is particularly well suited to the derivation of site-specific numeric criteria where the proper construction and implementation of such an approach can result in defensible site-specific adjustments to numeric ambient water quality criteria.[164]

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[158] 40 CFR 131.11(a)
[159] 40 CFR 131.11(b)
[160] EPA. 2000. *Methodology for Deriving Ambient Water Quality Criteria for the Protection of Human Health*. U.S. Environmental Protection Agency, Office of Water, EPA-822-B-00-004. pages 2-13. Available at: http://www.epa.gov/waterscience/criteria/humanhealth/method/complete.pdf
[161] 40 CFR 132 App. F., Proc. 1, A. 4
[162] April 27, 2000. *Federal Register*, Volume: 65, No.: 82, page: 24648 (65 FR 24648). Available at: http://www.gpo.gov/fdsys/pkg/FR-2000-04-27/pdf/00-8536.pdf
[163] April 27, 2000. *Federal Register*, Volume: 65, No.: 82, page: 24648 (65 FR 24648). Available at: http://www.gpo.gov/fdsys/pkg/FR-2000-04-27/pdf/00-8536.pdf
[164] April 27, 2000. *Federal Register*, Volume: 65, No.: 82, page: 24648 (65 FR 24648). Available at: http://www.gpo.gov/fdsys/pkg/FR-2000-04-27/pdf/00-8536.pdf

Oregon's site-specific background pollutant criterion provision was adopted as a performance-based approach to develop site-specific human health criteria for carcinogens under the conditions and procedures specified in their rule.[165] Oregon's July 21, 2011 submission letter specifically states that the provision was "adopted [as] a new performance-based water quality standard" and that it "establishes the procedure by which a site-specific criterion may be developed for a limited portion of the waterbody".[166] ODEQ's staff report EQC at the time of rule adoption indicates a clear intent for the rule to be adopted as a procedure by which, when approved by EPA, could be used to develop site-specific criteria that will not need subsequent approval by EPA.[167]

A performance-based approach relies on the State to specify methodologies and decision thresholds in their water quality standards regulations so that a structure or decision-making framework that is binding, clear, predictable and transparent is established. As with all other modifications to state water quality standards, EPA requires that the state provide opportunity for the public to comment on this rule and that the regulation be adopted consistent with state law. Oregon's site-specific pollutant criterion provision has been promulgated in OAR 340-041-0033(6) of Oregon's Water Quality Standards, has undergone public review and hearing through the process used for all other revisions adopted by the State on June 16, 2011, and has been certified as having been adopted pursuant to State law.[168] Therefore, EPA finds that this provision provides a regulatory framework for decision-making (i.e. criteria development) that is binding, predictable and transparent and that the public has had the opportunity to provide comment on the proposed rule.

EPA's guidance further notes that a performance-based "approach is particularly useful for criteria which are heavily influenced by site-specific factors."[169] In this case, Oregon has restricted the use of this provision to waterbodies where a waterbody contains a pollutant upstream of a water supply source and a NPDES discharger withdraws water from the waterbody and returns it to the same waterbody without adding any mass to the pollutant of concern. Additionally, the background pollutant provision specifies that it only applies to carcinogenic pollutants, OAR 340-041-0033(6)(b)(A), and utilizes information about the discharge to limit the criterion. Thus, EPA believes it is appropriate that such criterion be developed on a site-specific basis.

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[165] OAR 340-041-0033(6)
[166] ODEQ. July 21, 2011. Letter from Neil Mullane, Water Quality Division Administrator, to Michael Bussell, Office of Water and Watersheds, EPA Region 10. *Re: Oregon Submission of Revised State Water Quality Standards for Toxic Pollutants, Including a New Background Pollutant Provision and a Revised Variance Rule for EPA Review and Approval.*
[167] ODEQ. June 2, 2011. Memorandum from Dick Pedersen to Environmental Quality Commission; *Agenda item C, Rule adoption: Revised water quality standards for human health and revised water quality standards implementation policies*, June 15-17, EQC meeting. Oregon Department of Environmental Quality. page 11. Available at: http://www.deq.state.or.us/about/eqc/agendas/attachments/2011june/C-WQStdsStaffRpt.pdf
[168] Oregon Department of Justice. General Counsel Division. July 20, 2011. Letter from Larry Knudsen, Assistant Attorney General, Natural Resources Section, to Michael Bussell, EPA Region 10. *Re: Certification of Water Quality Standard Amendment (Fish Consumption Rate).*
[169] April 27, 2000. *Federal Register*, Volume: 65, No.: 82, page: 24648 (65 FR 24648). Available at: http://www.gpo.gov/fdsys/pkg/FR-2000-04-27/pdf/00-8536.pdf

Finally, EPA's guidance specifies that such procedures "must include a public participation step to provide all stake-holders and the public an opportunity to review the data and calculations supporting the site-specific application of the implementation procedures." The State would also need to maintain a publically available, comprehensive list of all site-by-site decisions made

using the procedures.[170] Oregon's WQS regulation at OAR 340-041-0033(6)(i) establishes the public notification requirements for any criterion to be adopted under this provision. It specifically requires ODEQ to provide public notice of the proposal and hold a public hearing. In addition to other public notification procedures in place by the State, ODEQ will publish the proposal on their WQS website. Furthermore, the provision requires ODEQ to publish a list of all criteria approved pursuant to the rule within 30 days of its effective date and identifies the minimum elements to be contained in this list. EPA believes that the public process required by Oregon within OAR 340-041-0033(6)(i) is consistent with that described in EPA's guidance and required by 40 CFR 131.11.

In order to provide further guidance to ODEQ staff and to ensure consistent implementation of the provision, ODEQ will develop an Internal Management Directive (guidance document) within 180 days of EPA's action on this provision.[171] This document will be available on ODEQ's website and thus facilitate even greater clarity and transparency for the public.

In consideration of the above factors, EPA concludes that the provision contains a binding, clear, predictable, and transparent framework such that any site-specific criterion generated under the provision must not result in a human health risk level of greater than 1×10^{-4} and will protect the human health uses of Oregon's waters. Therefore, any additional oversight by EPA would be redundant. Thus, the provision contains sufficient detail, and suitable safeguards, that EPA's approval of the provision serves as the Clean Water Act § 303(c)(3) approval of the individual site-specific criteria to be generated under the provision. Since this procedure is adopted into State regulation and Oregon is bound by the decision-making framework contained therein, any criteria which are not derived in accordance with the approved procedures would need separate approval from EPA to be applicable under the CWA.

When EPA reviews the results of Oregon's triennial review, EPA expects to evaluate a representative subset of the site-specific decisions to ensure that Oregon is adhering to the EPA-approved procedure. Finally, EPA notes that if Oregon fails to follow these procedures and does not obtain separate CWA § 303(c)(3) approval for the site-specific criterion, this would provide EPA with a basis to object to an NPDES permit for not deriving from or complying with the applicable standards.[172]

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[170] April 27, 2000. *Federal Register*, Volume: 65, No.: 82, page: 24648 (65 FR 24648). Available at: http://www.gpo.gov/fdsys/pkg/FR-2000-04-27/pdf/00-8536.pdf

[171] ODEQ. June 2, 2011. Memorandum from Dick Pedersen to Environmental Quality Commission; *Agenda item C, Rule adoption: Revised water quality standards for human health and revised water quality standards implementation policies*, June 15-17, EQC meeting. Oregon Department of Environmental Quality. Supplemental Attachment 10, Timeline for Follow-Up Actions, WQS for Human Health Toxic Pollutants Rulemaking.

[172] 40 CFR 122.44(d)
April 27, 2000. *Federal Register*, Volume: 65, No.: 82, page: 24648 (65 FR 24648). Available at: http://www.gpo.gov/fdsys/pkg/FR-2000-04-27/pdf/00-8536.pdf

VII. VARIANCE PROVISION

A. *BACKGROUND*

EPA's regulations at 40 C.F.R. Part 131.13, provides that states may, at their discretion, include in state water quality standards policies generally affecting the application and implementation of water quality standards, such as general policies for variances. If a state chooses to adopt such a variance policy, the regulation specifies that such policies are required to be submitted to EPA for review and approval.

The objective of the Clean Water Act is to restore and maintain the chemical, physical and biological integrity of the Nation's waters. The CWA further specifies an interim goal that, "wherever attainable," water quality provides for the protection and propagation of fish, shellfish, and wildlife and provides for recreation in and on the water.

40 C.F.R. Part 131.10(g) specifies the factors a state may use to determine that a designated use, which is not an existing use, is not ultimately attainable. These factors are:

1. Naturally occurring pollutant concentrations prevent the attainment of the use; or
2. Natural, ephemeral, intermittent or low flow conditions or water levels prevent the attainment of the use, unless these conditions may be compensated for by the discharge of sufficient volume of effluent discharges without violating state water conservation requirements to enable uses to be met; or
3. Human caused conditions or sources of pollution prevent the attainment of the use and cannot be remedied or would cause more environmental damage to correct than to leave in place; or
4. Dams, diversions or other types of hydrologic modifications preclude the attainment of the use, and it is not feasible to restore the water body to its original condition or to operate such modification in a way that would result in the attainment of the use; or
5. Physical conditions related to the natural features of the water body, such as the lack of a proper substrate, cover, flow, depth, pools, riffles, and the like, unrelated to water quality, preclude attainment of aquatic life protection uses; or
6. Controls more stringent than those required by sections 301(b) and 306 of the Act would result in substantial and widespread economic and social impact.

In 1977, an Office of General Counsel legal opinion[173] considered the practice of temporarily downgrading the designated use and criteria, as it applies to a specific discharger rather than permanently[174] downgrading an entire water body or water body segment and determined that

[173] EPA. March 29, 1977. *Office of General Counsel on Matters of Law Pursuant to 40 CFR Section 125.36(m). No. 58.* U.S. Environmental Protection Agency. Washington, D.C. Available at: http://water.epa.gov/scitech/swguidance/standards/upload/2008_08_04_standards_section40cfr3.pdf

[174] "Permanent" used in the context of a designated use is intended solely to differentiate from a time-limited variance. EPA's regulations at 131.20 require states to review uses that do not include those specified in CWA section 101(a)(2) and to revise standards accordingly if information becomes available to indicate such uses are attainable.

such a practice is acceptable as long as it is adopted consistent with the substantive requirements for permanently downgrading a designated use. EPA continued to articulate this position in its *Water Quality Standards Handbook* (Section 5.3) specifically stating:

> *Variance procedures involve the same substantive and procedural requirements as removing a designated use , but unlike use removal, variances are both discharger and pollutant specific, are time limited, and do not forego the currently designated use.*

Thus, the six 131.10(g) factors, which are used to justify a designated use change through a use attainability analysis, consistent with 131.10(g), are the same factors that must be evaluated when justifying a variance.

Variances allow for a more site-specific and time-limited consideration of attainability than a permanent designated use revision. They encourage states to maintain the underlying designated uses and criteria as goals instead of declaring them unattainable prematurely when they may be attainable in the long term. For example, technology improvements could lower treatment costs in the future such that attaining the designated use and criteria would no longer cause substantial and widespread economic and social impact. Variances are typically specific to a pollutant(s) and either apply to specific permittees or geographic areas. Variances only apply to the pollutants, permittees and geographic areas for which they were written; all other applicable standards remain in place.

Variances must be of a limited or temporary duration for a fixed term.[175] Variances are time-limited designated uses and associated criteria and are thus considered water quality standards. As such, any variances granted by the state must be submitted to EPA for review and approval or disapproval under CWA section 303(c). The preamble to EPA's 1983 regulation[176] states that EPA has approved state-adopted variances in the past and will continue to do so if each individual variance is adopted as a water quality standard and subject to the same public review as other changes in the water quality standards. EPA's *Water Quality Standards Handbook*[177] reiterates the 1983 Preamble as did EPA's Advanced Notice of Proposed Rulemaking (ANPRM), in 1998, seeking comments on possible revisions to the Water Quality Standards Regulation.[178]

EPA's *Water Quality Standards Handbook* also specifies that EPA has approved state-adopted variances in the past and will continue to do so if:

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[175] EPA. January 24, 1992. Office of General Counsel Memorandum *Re: Request for Views on Allowable Duration of Water Quality Standards Variances.* U.S. Environmental Protection Agency. Catherine A Winer, Attorney. Available at: http://water.epa.gov/scitech/swguidance/standards/upload/1999_11_03_standards_variancememo.pdf
[176] November 8, 1983. *Federal Register*, Volume: 48, No.: 217, page 51403 (48 FR 51403). Available at: http://nepis.epa.gov/Exe/ZyPURL.cgi?Dockey=20003ZVR.txt
[177] EPA. 1994. *Water Quality Standards (WQS) Handbook: Second Edition.* August 1994. United States Environmental Protection Agency, Office of Water. EPA-823-B-94-005a. page 5-12. Available at http://water.epa.gov/scitech/swguidance/standards/handbook/index.cfm
[178] July 7, 1998. *Federal Register*, Volume: 63, No.: 129, page: 36759 (63 FR 36759). Available at: http://water.epa.gov/scitech/swguidance/standards/handbook/upload/1998_07_07_1998_July_Day-07_w17513.pdf

- The State includes the individual variance as part of the water quality standard.
- The state demonstrates that meeting the standard is unattainable based on one or more of the factors in 131.10(g).
- The justification submitted includes documentation that treatment more advanced than that required by sections 301(b)(1)(b) and 306 of the Clean Water Act has been carefully considered and that alternative effluent control strategies have been evaluated.
- The more stringent State criterion is maintained and is binding upon all other dischargers on the stream or stream segment.
- The discharger who is given a variance for one particular constituent is required to meet the applicable criteria for other constituents.
- The variance was granted for a specific period of time.
- The discharger either must meet the standard upon the expiration of this time period or must make a new demonstration of "unattainability."
- Reasonable progress is being made toward meeting the water quality standards.
- The variance was subjected to public notice and opportunity for comment.

In summary, states have the discretion to include variance policies in their water quality standards regulation. Such policies are subject to EPA review and approval. In addition, if a state chooses to revise standards by granting a variance, states must adopt such variances pursuant to state law and each individual variance is subject to public review, consistent with EPA's regulations. Variances are not effective for Clean Water Act purposes until approved by EPA.

B. *ODEQ'S JULY 21, 2011 SUBMITTAL*

ODEQ has removed the variance language found at OAR 340-041-0061(2) and replaced it with new language at OAR 340-041-0059. Oregon's revised variance provision lays out the necessary process for obtaining a variance, the conditions under which a variance will be granted, and the requirements during a variance. DEQ's objective for these revisions is to ensure that variances and their accompanying pollutant reduction plans continue to ensure progress toward meeting standards, to streamline the administration process, to require pollutant reduction plans with specific milestones that will result in water quality improvement, and to add general clarification to the rule.[179]

Below is ODEQ's revised variance provision, found at OAR 340-041-0059.

OAR 340-041-0059
Variances

This rule (OAR 340-041-0059) does not become applicable for purposes of ORS chapter 468B or the federal Clean Water Act unless and until EPA approves the provisions it identifies as water quality

[179] ODEQ. May 24, 2011. *Issue Paper: Implementing Water Quality Standards for Toxic Pollutants in NPDES Permits, Human Health Toxics Rulemaking.* Oregon Department of Environmental Quality. Available at: http://www.deq.state.or.us/wq/standards/docs/toxics/humanhealth/rulemaking/NPDESIssuePaper.pdf

standards pursuant to 40 CFR 131.21 (4/27/2000).

(1) Applicability. Subject to the requirements and limitations set out in sections (2) through (7) below, a point source may request a water quality standards variance where it is demonstrated that the source cannot feasibly meet effluent limits sufficient to meet water quality standards. The director of the department will determine whether to issue a variance for a source covered by an existing NPDES permit. The commission will determine whether to issue a variance for a discharger that does not have a currently effective NPDES permit.

(a) The variance applies only to the specified point source permit and pollutant(s); the underlying water quality standard(s) otherwise remains in effect.

(b) The department or commission may not grant a variance if:

(A) The effluent limit sufficient to meet the underlying water quality standard can be attained by implementing technology-based effluent limits required under sections 301(b) and 306 of the federal Clean Water Act, and by implementing cost-effective and reasonable best management practices for nonpoint sources under the control of the discharger; or

(B) The variance would likely jeopardize the continued existence of any threatened or endangered species listed under section 4 of the Endangered Species Act or result in the destruction or adverse modification of such species' critical habitat; or

(C) The conditions allowed by the variance would result in an unreasonable risk to human health; or

(D) A point source does not have a currently effective NPDES permit, unless the variance is necessary to:

(i) Prevent or mitigate a threat to public health or welfare;

(ii) Allow a water quality or habitat restoration project that may cause short term water quality standards exceedances, but will result in long term water quality or habitat improvement that enhances the support of aquatic life uses;
(iii) Provide benefits that outweigh the environmental costs of lowering water quality. This analysis is comparable to that required under the antidegradation regulation contained in OAR-041-0004(6)(b); or

(E) The information and demonstration submitted in accordance with section (4) below does not allow the department or commission to conclude that a condition in section (2) has been met.

(2) Conditions to Grant a Variance. Before the commission or department may grant a variance, it must determine that:

(a) No existing use will be impaired or removed as a result of granting the variance and

(b) Attaining the water quality standard during the term of the variance is not feasible for one or

more of the following reasons:

(A) Naturally occurring pollutant concentrations prevent the attainment of the use;

(B) Natural, ephemeral, intermittent, or low flow conditions or water levels prevent the attainment of the use, unless these conditions may be compensated for by the discharge of sufficient volume of effluent discharges to enable uses to be met without violating state water conservation requirements;

(C) Human-caused conditions or sources of pollution prevent the attainment of the use and cannot be remedied or would cause more environmental damage to correct than to leave in place;

(D) Dams, diversions, or other types of hydrologic modifications preclude the attainment of the use, and it is not feasible to restore the waterbody to its original condition or to operate such modification in a way which would result in the attainment of the use;

(E) Physical conditions related to the natural features of the waterbody, such as the lack of a proper substrate, cover, flow, depth, pools, riffles, and unrelated to water quality preclude attainment of aquatic life protection uses; or

(F) Controls more stringent than those required by sections 301(b) and 306 of the federal Clean Water Act would result in substantial and widespread economic and social impact.

(3) Variance Duration.

(a) The duration of a variance must not exceed the term of the NPDES permit. If the permit is administratively extended, the permit effluent limits and any other requirements based on the variance and associated pollutant reduction plan will continue to be in effect during the period of the administrative extension. The department will give priority to NPDES permit renewals for permits containing variances and where a renewal application has been submitted to the director at least one hundred eighty days prior to the NPDES permit expiration date.

(b) When the duration of the variance is less than the term of a NPDES permit, the permittee must be in compliance with the specified effluent limitation sufficient to meet the underlying water quality standard upon the expiration of the variance.

(c) A variance is effective only after EPA approval. The effective date and duration of the variance will be specified in a NPDES permit or order of the commission or department.

(4) Variance Submittal Requirements. To request a variance, a permittee must submit the following information to the department:

(a) A demonstration that attaining the water quality standard for a specific pollutant is not feasible for the requested duration of the variance based on one or more of the conditions found in section (2)(b) of this rule;

(b) A description of treatment or alternative options considered to meet limits based on the applicable underlying water quality standard, and a description of why these options are not technically, economically, or otherwise feasible;

(c) Sufficient water quality data and analyses to characterize ambient and discharge water pollutant concentrations;

(d) Any cost-effective and reasonable best management practices for nonpoint sources under the control of the discharger that addresses the pollutant the variance is based upon;

(e) A proposed pollutant reduction plan that includes any actions to be taken by the permittee that would result in reasonable progress toward meeting the underlying water quality standard. Such actions may include proposed pollutant offsets or trading or other proposed pollutant reduction activities, and associated milestones for implementing these measures. Pollutant reduction plans will be tailored to address the specific circumstances of each facility and to the extent pollutant reduction can be achieved; and

(f) If the discharger is a publicly owned treatment works, a demonstration of the jurisdiction's legal authority (such as a sewer use ordinance) to regulate the pollutant for which the variance is sought. The jurisdiction's legal authority must be sufficient to control potential sources of that pollutant that discharge into the jurisdiction's sewer collection system.

(5) Variance Permit Conditions. Effluent limits in the discharger's permit will be based on the variance and not the underlying water quality standard, so long as the variance remains effective. The department must establish and incorporate into the discharger's NPDES permit all conditions necessary to implement and enforce an approved variance and associated pollutant reduction plan. The permit must include, at a minimum, the following requirements:

(a) An interim concentration based permit limit or requirement representing the best achievable effluent quality based on discharge monitoring data and that is no less stringent than that achieved under the previous permit. For a new discharger, the permit limit will be calculated based on best achievable technology;

(b) A requirement to implement any pollutant reduction actions approved as part of a pollutant reduction plan submitted in accordance with section (4)(e) above and to make reasonable progress toward attaining the underlying water quality standard(s);

(c) Any studies, effluent monitoring, or other monitoring necessary to ensure compliance with the conditions of the variance; and

(d) An annual progress report to the department describing the results of any required studies or monitoring during the reporting year and identifying any impediments to reaching any specific milestones stated in the variance.

(6) Public Notification Requirements.

(a) If the department proposes to grant a variance, it must provide public notice of the proposal and hold a public hearing. The public notice may be included in the public notification of a draft NPDES permit or other draft regulatory decision that would rely on the variance;

(b) The department will publish a list of all variances approved pursuant to this rule. Newly approved variances will be added to this list within 30 days of their effective date. The list will identify: the discharger; the underlying water quality standard addressed by the variance; the waters of the state to which the variance applies; the effective date and duration of the variance;

the allowable pollutant effluent limit granted under the variance; and how to obtain additional information about the variance.

(7) Variance Renewals.

(a) A variance may be renewed if:

(A) The permittee makes a renewed demonstration pursuant to section (2) of this rule that attaining the water quality standard continues to be infeasible,

(B) The permittee submits any new or updated information pertaining to any of the requirements of section 4,

(C) The department determines that all conditions and requirements of the previous variance and actions contained in the pollutant reduction plan pursuant to section (5) have been met, unless reasons outside the control of the discharger prevented meeting any condition or requirement, and

(D) All other requirements of this rule have been met.

(b) A variance renewal must be approved by the department director and by EPA.

C. *EPA ACTION ON ODEQ'S REVISED VARIANCE PROVISION*

EPA Action

In accordance with its CWA authority, 33 U.S.C § 1313(c)(3) and 40 C.F.R. part 131, EPA approves certain sections of Oregon's revised variance provision at OAR 340-041-0059, as detailed below, because they are consistent with the Clean Water Act and the implementing Federal water quality standards regulations governing EPA's review and approval or disapproval of new or revised water quality standards as required in 40 C.F.R. part 131. These federal regulations as well as EPA's guidance, to date, on variances are detailed above. EPA outlines below the sections of the provision it is approving as water quality standards pursuant to CWA section 303(c) and the sections of the provision which are not water quality standards under CWA section 303(c) and therefore upon which EPA is taking no action. Oregon may use the full variance provision (both those sections approved as WQS and those identified as not being WQS) when developing and implementing any individual variance. Each individual variance the State adopts consistent with the regulations at OAR 340-041-0059, must be submitted to EPA for review and approval prior to its use in a NPDES permit or other CWA action. In EPA's review of Oregon's revised variance provision, the Agency considered information submitted on July 21, 2011 including ODEQ's NPDES Implementation Issue Paper[180] and Response to Comments document.[181]

[180] ODEQ. May 24, 2011. *Issue Paper: Implementing Water Quality Standards for Toxic Pollutants in NPDES Permits, Human Health Toxics Rulemaking.* Oregon Department of Environmental Quality. Available at: http://www.deq.state.or.us/wq/standards/docs/toxics/humanhealth/rulemaking/NPDESIssuePaper.pdf

[181] ODEQ. May 2011. *Response to Comments: Proposed Water Quality Standards for Human Health and Water Quality Standards Implementation Policies.* Oregon Department of Environmental Quality. page 21. Available at: http://www.deq.state.or.us/wq/standards/docs/toxics/humanhealth/rulemaking/ResponseToComments.pdf

EPA Rationale
EPA has reviewed the provision at OAR 340-041-0059 in Oregon's water quality standards regulations, entitled, "Variances". EPA previously approved Oregon's existing variance provision at OAR 350-041-0061(2).

Oregon's revised variance provision adds more definition to what was required in OAR 350-041-0061(2) and requires the applicant to develop a schedule for improvements by implementing a pollution reduction plan. These revisions will assist in meeting the goal of facilitating water quality improvements and attaining the underlying criteria.

EPA is approving the specified sections of Oregon's variance regulation explained below as a "general policy" under §131.13. ODEQ is still required to submit each individual variance to EPA for review and action before it is effective for purposes of the CWA because the variances themselves are also water quality standards. Accordingly, each variance submitted for EPA's review must include the Attorney General's certification and be consistent with the CWA and EPA's implementing regulations, including all applicable public participation requirements. Thus, EPA's review of Oregon's variance authorizing provision need not evaluate each hypothetical variance the State may issue under OAR 340-041-0059 and consider whether such a variance would be consistent with the CWA and EPA's implementing regulation. EPA's approval of Oregon's variance provision at OAR 340-041-0059 is not an automatic approval of any future variance the State wishes to grant pursuant to these provisions.

Below, EPA outlines the sections it is approving as water quality standards pursuant to CWA section 303(c) and the sections upon which EPA is taking no action. EPA's approval reflects EPA's determination that the specific section adopted at OAR 340-041-0059 is consistent with the Clean Water Act and the implementing Federal water quality standards regulations in 40 C.F.R. part 131.

Introductory Language to OAR 340-041-0059
EPA is approving the introductory language which states, "This rule (OAR 340-041-0059) does not become applicable for purposes of ORS chapter 468B or the federal Clean Water Act unless and until EPA approves the provisions it identifies as water quality standards pursuant to 40 CFR 131.21 (4/27/2000)."

In accordance with its Clean Water Act authority, 33 U.S.C § 1313(c)(3) and 40 C.F.R. part 131, EPA approves this new language. This language describes when Oregon's revised variance provision becomes effective under state law and the Clean Water Act. The effective date of water quality standards provisions under the CWA is determined by the date of EPA approval. This language regarding timing is a water quality standard that provides for the sections of the revised variance provision to be immediately in effect at the time of EPA's approval action.

OAR 340-041-0059(1) "Applicability"
EPA is approving OAR 340-041-0059(1) "Applicability" and OAR 340-041-0059(1)(a) which reflects that the variance only applies to the specified point source and pollutant; the underlying water quality standards remain in effect. This scope of applicability is consistent with EPA interpretive Guidance and the 1977 Office of General Counsel legal opinion discussing

variances.

Moreover, EPA is approving OAR 340-041-0059(1)(b) and (1)(b)(A) as they are consistent with 131.10(h)(2) which prohibits a State's removal of a designated uses where "[s]uch uses will be attained…by implementing cost-effective and reasonable best management practices for nonpoint source control." EPA has concluded that Oregon's language at (1)(b)(A) that prohibits the State from issuing a variance where *"effluent limitations sufficient to meet the underlying water quality standards can be attained by…implementing cost-effective and reasonable best management practices for nonpoint sources under the control of the discharger,"* is consistent with 131.10(h)(2) because Oregon's variance authorizing provision only allows the State to issue discharger-specific variances.[182] Given this scope of Oregon's variance authorizing provision, EPA believes it is reasonable for the State to limit the prohibition in (1)(b)(A) to those cost-effective and reasonable best management practices for nonpoint sources to those practices under the control of the discharger.[183]

EPA is approving OAR 340-041-0059(1)(b)(B)-(E) because these sections are not inconsistent with the CWA and EPA's implementing regulations. While OAR 340-041-0059(1)(b)(D) does not categorically prohibit the issuance of a variance to a new discharger, neither do the CWA or EPA's implementing regulations. While 40 CFR 122.4(i) limits discharges from "a new source or a new discharger" that "will cause or contribute to the violation of water quality standards," a variance is a revision to the water quality standard itself, and therefore 122.4(i) is not relevant. EPA notes, however, that the circumstances in which a new discharger will be able to meet the other requirements for a variance (e.g., a demonstration that [a]ttaining the water quality standard during the term of the variance is not feasible,") are likely to be significantly more limited for a new discharger than an existing discharger. EPA acknowledges that granting a variance to a new discharger may be appropriate under very specific and limited circumstances. It will review the appropriateness of particular circumstances on an individual variance basis.

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[182] OAR 340-041-0059(1)(a) provides that the "variance applies only to the specified point source permit and pollutant(s); the underlying water quality standard(s) otherwise remain in effect."

[183] EPA disagrees with the contrary contention, made in public comments, that the BMP requirements of 40 C.F.R. § 131.10(h)(2) must apply to "all nonpoint sources in the consideration of a variance application, not just those under the control of the applicant." Northwest Environmental Advocates (NWEA). March 17, 2011. Letter from Nina Bell, Executive Director, NWEA to Andrea Matzke, ODEQ, *Re: Proposed Revised Water Quality Standards for Human Health Toxic Pollutants and Revised Water Quality Standards Implementation Policies.* page 32. In support of this proposition, the commenter cites a 1994 EPA interpretive memorandum ("Tudor Davies memo") and a 1995 EPA economic guidance document. The Tudor Davies memo discusses how the requirements of 40 CFR 131.12(a)(2) apply to antidegradation policies, not the applicability of 40 CFR 131.10(h)(2) to variances. The citation to the 1995 Interim Economic Guidance for Water Quality Standards is similarly inapposite. This guidance addresses how an economic analysis under 131.10(g)(6) should be conducted to demonstrate that a variance is needed. Sections 40 C.F.R. 131.10(d) and (h)(2) are independent requirements from 131.10(g). EPA recognizes that the introduction section of the guidance document states that polluting entities can be point or nonpoint sources of pollution and that attainment of water quality standards is not limited to controls placed on point sources. However, this statement should be viewed in context of the stated scope of the guidance, which is to address economic factors considered under 131.10(g) and 131.12. Even if this statement could be read to apply to 131.10(d) and (h)(2), Oregon's provision at OAR 340-041-0059(1)(b)(A) is consistent with EPA's 1995 economic guidance document because the guidance contemplates that financial impacts are determined by the costs the entity itself would face by implementing the necessary pollution controls.

OAR 340-041-0059(2) "Conditions to Grant a Variance"
EPA is approving OAR 340-041-0059(2), (2)(a) and (2)(b) "Conditions to Grant a Variance" because it is consistent with the substantive requirements of permanently changing designated uses at §131.10, specifically §131.10(g).

OAR 340-041-0059(2)(a) requires the state to determine that "[n]o existing use will be impaired or removed as a result of granting the variance." One commenter argues that this section is inconsistent with EPA's regulations because it "does not explicitly require variances to meet the antidegradation policy[,]…falls short of full protection of existing uses[,]… [and] makes no reference to the water quality that is required to maintain and protect existing uses."[184] EPA disagrees that OAR 340-041-0059(2)(a) is inconsistent with EPA regulations. OAR 340-041-0059(2)(a) is consistent with 131.10(h)(1) and (g) which both prohibit a state from removing the protection for an existing use. While a state's adoption of new or revised water quality standards is not itself subject to antidegradation review, EPA notes that OAR 340-041-0059(2)(a) is also consistent with 131.12(a)(1): requiring the that "[e]xisting instream water uses and the level of water quality necessary to protect the existing uses shall be maintained and protected." EPA believes that prohibiting the impairment or removal of an existing use will achieve the goals of "maintain[ing] and protect[ing]" the "level of water quality necessary to protect the existing use."

Section OAR 340-041-0059(2)(b) is consistent with the substantive requirements at §131.10(g).

OAR 340-041-0059(3) "Variance Duration"
EPA is approving OAR 340-041-0059(3) and the first sentence of OAR 340-041-0059(3)(a) "Variance Duration" as a water quality standard that states "The duration of a variance must not exceed the term of the NPDES permit." EPA understands this section to mean that each variance will expire five years after the State adopts the variance, the maximum length of a NPDES permit consistent with federal regulations and OAR 340-045-0035(8), or the variance will specify a specific expiration date of less than five years after the variance was adopted into state regulation. As discussed earlier, the 1977 Office of General Counsel legal opinion explains that time-limited revisions to the designated use and criteria are environmentally preferable as compared with the permanent removal of a designated use because the more stringent standards apply to all other dischargers not covered by the variance. EPA is approving this sentence as it states the specific time limit for which the designated use and criteria have been determined to be "unattainable" consistent with §131.10(g).

EPA is taking no action on the last two sentences of OAR 340-041-0059(3)(a) "Variance Duration" that states "If the permit is administratively extended, the permit effluent limits and any other requirements based on the variance and associated pollutant reduction plan will continue to be in effect during the period of the administrative extension. The department will give priority to NPDES permit renewals for permits containing variances and where a renewal application has been submitted to the director at least one hundred eighty days prior to the

[184] Northwest Environmental Advocates (NWEA). March 17, 2011. Letter from Nina Bell, Executive Director, NWEA to Andrea Matzke, ODEQ, *Re: Proposed Revised Water Quality Standards for Human Health Toxic Pollutants and Revised Water Quality Standards Implementation Policies.* page 39.

NPDES permit expiration date." These sections are NPDES permitting requirements because they describe the permitting process for handling situations where there is a delay in reissuing a permit. Such language does not affect how long the variance applies as the approved water quality standard and the administrative extension of a permit is not subject to EPA WQS approval or disapproval.

EPA is also taking no action on OAR 340-041-0059(3)(b) "Variance Duration" because that section of the provision reiterates the permitting provisions at §122.44(d)(vii) requiring the NPDES permit limit to derive from and comply with the applicable water quality standards once the variance expires. Therefore, EPA does not consider this section to be a water quality standard.

EPA is approving OAR 340-041-0039(3)(c) "Variance Duration" as a water quality standard because it clearly states that the variance is not effective for CWA section 402 permitting purposes until EPA approves it, consistent with §131.21(c). EPA notes that once an individual variance has been approved, it is a water quality standard applicable for CWA section 402 permitting purposes (see 40 CFR 131.21) and thus becomes subject to the triennial review requirements at 40 C.F.R. 131.20.

OAR 340-041-0059(4) "Variance Submittal Requirements"
EPA is approving OAR 340-041-0059(4) "Variance Submittal Requirements" and OAR 340-041-0059(4)(a) consistent with §131.10(g) because it requires a demonstration that one of EPA's regulatory factors precludes attainment of the use. EPA is also approving OAR 340-041-0059(4)(b)-(f) because these sections provide substantive requirements for what the applicant must submit to the State to obtain a variance, and are not inconsistent with the requirements of the CWA and EPA's regulations.

OAR 340-041-0059(5) "Variance Permit Conditions"
EPA is approving OAR 340-041-0059(5), (5)(a) and (5)(b) "Variance Permit Conditions" because these sections establish the water quality requirements during a variance. While those requirements might typically be presented in the form of instream water quality criteria, EPA considers the requirement for a permit limit to include the best achievable effluent quality to be a surrogate for identifying the instream water quality criteria at the highest attainable condition. Thus, EPA is approving sections 5(a) and 5(b) because they describe the resulting instream concentration and together act as a surrogate for interim criterion applicable during a variance. Based on Oregon's regulatory language in this section, the best achievable effluent quality will be appropriately determined on a case-by-case basis.

EPA is not taking action on OAR 340-041-0059(5)(c) and (5)(d) because they are monitoring and reporting requirements applicable to a discharger's NPDES permit. These requirements are not considered WQS under CWA section 303(c) or addressed in EPA's water quality standards regulations because they are NPDES permitting requirements.

OAR 340-041-0059(6) "Public Notice Requirements"
EPA is approving OAR 340-041-0059(6) "Public Notice Requirements" and OAR 340-041-0059(6)(a) and 0059(6)(b) because they address the requirements for public notice of a variance

consistent with §131.20(b), and explain what information will be provided to the public. EPA notes that this section states that public notification for a variance can be included in the public notification of a draft NPDES permit or draft regulatory decision that would rely on the variance. In addition, EPA must approve the variance before it can be implemented and thus the State cannot finalize the NPDES permit with a limit that reflects a variance until EPA has approved the variance.

OAR 340-041-0059(7) "Variance Renewals"

EPA is approving OAR 340-041-0059(7) "Variance Renewals". EPA is approving OAR 340-041-0059(7)(a)(A) as consistent with 131.10(g) as it requires the permittee to demonstrate that attaining water quality standards during the term of the variance is still not feasible based on factors consistent with 131.10(g)(1)-(6). EPA is approving all other language in OAR 340-041-0059(7) because this regulatory language is not inconsistent with the CWA or EPA's implementing regulations. EPA notes that since variances are water quality standards, the state will need to include variances in the applicable water quality standards that the state reviews during its triennial review processes under §131.20(a). EPA understands that OAR 340-041-0059(7)(D) ("[a]ll other requirements of this rule have been met.") will require a new round of public notice, comporting with the requirements of OAR 340-041-0059(6), and all other requirements in OAR 340-041-0059 to be met when any variance is renewed.

VIII. BACTERIA

Oregon's revisions to its bacteria provision found at OAR 340-041-0009(10) are shown in underline/strikeout format below. Underlined text represents added text, while text with a line through the middle (strikeout) represents deleted text. The revised text corrects a citation based on renumbering in OAR 340-041-0061.

(10) Water Quality Limited for Bacteria: In those water bodies, or segments of water bodies identified by the Department as exceeding the relevant numeric criteria for bacteria in the basin standards and designated as water-quality limited under section 303(d) of the Clean Water Act, the requirements specified in section 11 of this rule and in OAR 340-041-0061(11~~2~~) must apply.

EPA Action
In accordance with its CWA authority, 33 U.S.C § 1313(c)(3) and 40 C.F.R. part 131, EPA approves this minor editorial change as a non-substantive revision to water quality standards at OAR 340-041-0009.

EPA Rationale
The minor editorial change in this provision to correct the citation due to a renumbering revision in OAR 340-041-0061(12) does not alter the underlying provision that EPA previously approved and EPA is not acting on the underlying provision. EPA approves this non-substantive revision to Oregon's WQS under section 303(c) of the CWA and the implementing regulations at 40 CFR Part 131.

IX. REVISED RULES REGARDING IMPLEMENTAIN FOR NONPOINT SOURCES

A. *STATEWIDE NARRATIVE CRITERIA*

Oregon's revisions to OAR 340-041-0007(5) are shown in underline/strikeout format below. Underlined text represents added text, while text with a line through the middle (strikeout) represents deleted text. The revised rule clarifies the state regulatory mechanisms for water quality control applicable to forest management activities.

(5) Logging and forest management activities must be conducted in accordance with the ~~Oregon~~ rules established by the Environmental Quality Commission and must not cause violation of water quality standards. Nonpoint sources of pollution from forest operations on state and private forest lands are subject to best management practices and other control measures established by the Oregon Board of Forestry as provided in ORS 527.765 and 527.770. Forest ~~Practices~~ operations conducted in good faith compliance with the best management practices and control measures established under the Forest Practices Act ~~to minimize adverse effects on water quality~~ are generally deemed not to cause violations of water quality standards as provided in ORS 527.770. Forest operations are subject to load allocations established under ORS 468B.110 and OAR Division 340-042 to the extent needed to implement the federal Clean Water Act.

Acknowledgement of OAR 340-041-0007(5)
EPA acknowledges the revised language contained in OAR 340-041-0007(5). ODEQ has revised their regulations to explain how the control measures applicable to forestry nonpoint sources under the Forest Practices Act are presumed to meet water quality standards and that forest operations are subject to load allocations in TMDLs.[185] Furthermore, the rule clarifies the water quality regulatory requirements for forest management activities in Oregon.

This rule states that certain activities related to logging and forest management are generally deemed not to cause violations of water quality standards if best management practices and control measures under the Forest Practices Act are followed. The CWA requires NPDES permits for discharges from point sources and compliance with that permit, but does not require that states develop enforceable regulatory programs for nonpoint sources. Whether a State chooses to make water quality standards directly enforceable for nonpoint sources is solely a matter of state law and the State has discretion as to how it enforces its laws. This provision is applicable only to nonpoint sources and their compliance with water quality standards and TMDL load allocations. As such EPA does not consider this provision to be a water quality standard under section 303(c) of the CWA. Water quality standards are provisions of State or Federal law which consist of a designated use or uses for waters of the United States, and water quality criteria necessary to protect the uses (40 CFR 131.3(i)).

[185] ODEQ. June 7, 2011. *Executive Summary. Human Health Toxics Rulemaking.* Oregon Department of Environmental Quality. page 9. Available at: http://www.deq.state.or.us/wq/standards/docs/toxics/humanhealth/rulemaking/ExecSummary.pdf

In addition, this provision does not include language that has the effect of changing the level of protection provided by Oregon's water quality criteria and therefore does not constitute a new or revised water quality standard. The provision defines how logging and forest management nonpoint sources activities must control their discharges in order to comply with Oregon's water quality standards, but it does not establish or revise any of the components of the water quality standards themselves.

Therefore, this provision is not considered a water quality standard subject to EPA review and approval and EPA is taking no action to approve or disapprove this provision.

B. *OTHER IMPLEMENTATION OF WATER QUALITY*

Oregon's revisions to implementation provisions found at OAR 340-041-0061(9)(a)(E), (10), and (11) are shown in underline/strikeout format below. Underlined text represents added text, while text with a line through the middle (strikeout) represents deleted text. The revised rule at (9)(a)(E) corrects an error to the cross-reference to the antidegradation policy. The revised rules in (10) and (11) explain how the mechanisms for forestry and agricultural nonpoint sources work to meet water quality standards and the total maximum daily load (TMDL) load allocations under the Forest Practices Act and Agriculture Water Quality Management Act.[186] Finally, the revised rule contains revised paragraph numbers for subsections (2) through (16) as the variance rule in section (2) was moved to OAR 340-041-0059.

(9)(a)(E) Mass loads assigned as described in paragraphs (B) and (C) of this subsection will not be subject to OAR 340-041-0004(9~~7~~);

Acknowledgement of OAR 340-041-0061(9)(a)(E)
EPA acknowledges the changed cross-reference located in OAR 340-041-0061(9)(a)(E) Other Implementation of Water Quality Criteria. Water quality standards are provisions of State or Federal law which consist of a designated use or uses for waters of the United States, and water quality criteria necessary to protect the uses (40 CFR 131.3(i)). EPA has determined this provision is not a WQS. Instead, the provision at section (9)(a)(E) is a NPDES permitting implementation provision and corrects an error to a regulatory citation to the antidegradation policy.

(10) Forestry on state and private lands. ~~For~~ Nonpoint sources of pollution from forest operations on state or private lands~~, water quality standards~~ are ~~intended to be attained and are implemented through~~ subject to best management practices and other control ~~mechanisms~~ measures established ~~under the Forest Practices Act (ORS 527.610 to 527.992) and rules thereunder, administered~~ by the Oregon Department of Forestry~~. Therefore,~~ under the Forest Practices Act, (ORS 527.610 to 527.992) Such forest operations ~~that are~~ when conducted in good faith compliance with the Forest Practices Act requirements are ~~(except for the limits set out in ORS 527.770) deemed in compliance with this division. DEQ will work with the Oregon~~

[186] ODEQ. June 7, 2011. *Executive Summary. Human Health Toxics Rulemaking.* Oregon Department of Environmental Quality. page 9. Available at: http://www.deq.state.or.us/wq/standards/docs/toxics/humanhealth/rulemaking/ExecSummary.pdf

~~*Department of Forestry to revise the Forest Practices program to attain water quality standards.*~~ *generally deemed not to cause violations of water quality standards as provided in ORS 527.770. Forest operations on state and private lands are subject to load allocations under ORS 468.110 and OAR 340, Division 42, to the extent necessary to implement the federal Clean Water Act.*

(11) ~~*Agricultural water quality management plans to reduce agricultural nonpoint source pollution are developed and implemented by the Oregon Department of Agriculture (ODA) through a cooperative agreement with the department to implement applicable provisions of ORS 568.900 to 568.933 and 561.191. If the department has reason to believe that agricultural discharges or activities are contributing to water quality problems resulting in water quality standards violations, the department may consult ODA. If water quality impacts are likely from agricultural sources and the department determines that a water quality management plan is necessary, the director may write a letter to the director of the ODA requesting that such a management plan be prepared and implemented to reduce pollutant loads and achieve the water quality criteria.*~~ *In areas subject to the Agricultural Water Quality Management Act, the Oregon Department of Agriculture (ODA) under ORS 568.900 to 568.933 and 561.191 develops and implements agricultural water quality management area plans and rules to prevent and control water pollution from agricultural activities and soil erosion on agricultural and rural lands. Area plans and rules must be designed to achieve and maintain water quality standards. If the department determines that the area plan and rules are not adequate to achieve and maintain water quality standards, the department will provide ODA with comments on what would be sufficient to meet WQS or TMDL load allocations. If a resolution cannot be agreed upon, the department will request the Environmental Quality Commission (EQC) to petition ODA for a review of part or all of water quality management area plan and rules. If a person subject to an ODA area plan and implementing rules causes or contributes to water quality standards violations, the department will refer the activity to ODA for further evaluation and potential requirements.*

Acknowledgement of OAR 340-041-0061(10) and (11)

EPA acknowledges the revised language in OAR 340-041-0061(10) and (11) Other Implementation of Water Quality Criteria. The revised rules in (10) and (11) explain how state rules for forestry and agricultural nonpoint sources are to be implemented consistent with water quality standards and the total maximum daily load (TMDL) load allocations.[187] These provisions set forth the extent to which Oregon requires nonpoint sources of pollution from forest operations under the Forest Practices Act and agricultural activities under the Agricultural Water Quality Management Act to control their discharges in order to protect water quality.

These rules state that forest operations and agricultural activities generally will not be deemed to cause violations of water quality standards if best management practices and control measures under the Forest Practices Act and water quality management area plans under the Agricultural Water Quality Management Act are followed and identify the process to be used when water quality concerns arise. Thus, the rule clarifies mechanisms for WQS implementation and

[187] ODEQ. June 7, 2011. *Executive Summary. Human Health Toxics Rulemaking.* Oregon Department of Environmental Quality. page 9. Available at: http://www.deq.state.or.us/wq/standards/docs/toxics/humanhealth/rulemaking/ExecSummary.pdf

compliance.

Whether a State chooses to make water quality standards directly enforceable for nonpoint sources is solely a matter of state law. The CWA requires NPDES permits for discharges from point sources and compliance with that permit, but does not require that states develop enforceable regulatory programs for nonpoint sources. These provisions are applicable only to nonpoint sources and how they comply with water quality standards and TMDL load allocations and as such are not water quality standards under section 303(c) of the CWA. Water quality standards are provisions of State or Federal law which consist of a designated use or uses for waters of the United States, and water quality criteria necessary to protect the uses (40 CFR 131.3(i)).

In addition, these provisions do not include language that has the effect of changing the level of protection provided by Oregon's water quality criteria and therefore do not constitute new or revised water quality standards. The provisions define the extent to which forest operations and agricultural operations that result in nonpoint source discharges must control their discharges in order to comply with Oregon's water quality standards, but they do not establish or revise any of the components of the water quality standards themselves.

Therefore, these provisions are not considered water quality standards subject to EPA review and approval and EPA is taking no action to approve or disapprove the provisions.

Acknowledgment of Section Renumbering in OAR 340-041-0061(2)-(16)
The revised rule contains revised paragraph numbers for subsections OAR 340-041-0061(2) through (16) as the variance rule in section (2) was moved to OAR 340-041-0059. EPA acknowledges the renumbering for subsections that were previously approved by EPA under 303(c) of the CWA as a non-substantive formatting change which does not require EPA action.