

EPA Clean Water Act 303(c) Determinations

On Oregon's New and Revised
Aquatic Life Toxic Criteria Submitted on
July 8, 2004, and as Amended by Oregon's
April 23, 2007 and July 21, 2011 Submissions

January 30, 2013

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I. INTRODUCTION

This document provides the basis for EPA's decisions under the federal water quality standards regulations at 40 CFR 131.11 and section 303(c) of the Clean Water Act (CWA) to approve or disapprove the new or revised aquatic life water quality criteria that Oregon submitted to EPA on July 8, 2004 as revised by Oregon's April 23, 2007 and July 21, 2011 submissions.

A. Clean Water Act Requirements for Water Quality Standards

Under Section 303(c) of the CWA and federal implementing regulations at 40 CFR § 131.4, states have the primary responsibility for reviewing, establishing, and revising WQS, which consist of the designated uses of a waterbody, or waterbody segment, the water quality criteria necessary to protect those designated uses, and an antidegradation policy. This statutory framework allows states to work with local communities to adopt appropriate designated uses (as required in 40 CFR § 131.10 (a)) and to adopt criteria to protect those designated uses (as required in 40 CFR § 131.11 (a)).

Section 303(c)(2)(B) requires states to adopt water quality criteria for toxic pollutants listed pursuant to Section 307(a)(1) for which EPA has published criteria under 304(a) where the discharge or presence of these toxics could reasonably be expected to interfere with the designated uses adopted by the state. In adopting such criteria, states must establish numeric values based on one of the following: (1) 304(a) guidance; (2) 304(a) guidance modified to reflect site-specific conditions; or, (3) other scientifically defensible methods (40 CFR § 131.11 (b)). In addition, states can establish narrative criteria where numeric criteria cannot be determined or to supplement numeric criteria.

States are required to review applicable WQS, and as appropriate, modify and adopt these standards (40 CFR § 131.20). The state must follow its own legal procedures for adopting such standards (40 CFR § 131.5) and submit certification by the state's attorney general or other appropriate legal authority within the state that the WQS were duly adopted pursuant to state law (40 CFR § 131.6(e)). Section 303(c) of the CWA also requires states to submit new or revised WQS to EPA for review.

EPA is required to review these changes to ensure revisions in designated water uses are consistent with the CWA and that new or revised criteria protect the designated water uses. Furthermore, the federal water quality standards regulations at 40 CFR § 131.21 state, in part, that when EPA disapproves a state's water quality standards, EPA shall specify changes that are needed to ensure compliance with the requirements of Section 303(c) of the CWA and federal water quality standards regulations.

B. History

In 1999, the Oregon Department of Environmental Quality (ODEQ) initiated a Water Quality Standards Review (triennial review) to update Oregon's criteria for toxic pollutants, which were based on the *Quality Criteria for Water 1986* (U.S. Environmental Protection Agency, Office of Water, Washington, D.C. EPA 440/5-86-001) 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 their aquatic life criteria¹. The Oregon Environmental Quality Commission (EQC) adopted these new and revised water quality standards on May 20, 2004. In accordance with

¹ A number of the actions described here also addressed changes to human health criteria. Those human health criteria were the subject of different EPA actions, and are not addressed further in this document.

Section 303(c) of the CWA the ODEQ submitted these revisions to the EPA for review and approval on July 8, 2004. The ODEQ's 2004 revisions to the water quality standards included the following:

1. Revisions to the water quality standards provision at OAR 340-041-0033(1), (2), and (3) that provide narrative language explaining the human health and aquatic life criteria tables.
2. Revisions to Table 20 (revised the introductory language to the table).
3. Addition of new tables 33A and 33B.

The ODEQ envisioned that once the EPA approved its new Tables 33A and 33B, Table 20 would become obsolete because Tables 33A and 33B would contain either the same, revised, or new criteria for all of the parameters in Table 20. However, if the EPA does not approve a given new or revised criterion then the corresponding criterion in Table 20 would remain in effect.

On February 22, 2007, the EQC adopted a number of rule revisions to correct errors and clarify language in Division 41 of the water quality standards rules as revised in 2004. This rulemaking corrected a number of typographical errors contained in Tables 33A and 33B, revised temperature narrative criteria for natural lakes, ocean and bays, cool water (including the Klamath River) and the Borax Lake Chub. During this rulemaking the revised freshwater and saltwater acute and chronic criteria for arsenic and the revised saltwater acute and chronic criteria for chromium VI, which were part of the 2004 aquatic life criteria revisions, were inadvertently removed from Table 33B. Oregon submitted these revisions to the EPA for review and approval on April 23, 2007. EPA did not act on any provisions related to aquatic life toxic criteria (including changes to Tables 20, 33A or 33B) except for a note to Table 33A and a note to Table 33B that showed which criteria Oregon believes may be used by the state in NPDES permits² (see February 28, 2011 letter from Michael A. Bussell, EPA to Neil Mullane, ODEQ).

On June 1, 2010 EPA completed its review of Oregon's new and revised human health (but not aquatic life) water quality criteria for toxics and revisions to the narrative toxic provisions submitted to EPA on July 8, 2004. In that action, EPA approved the revisions to the narrative toxic provisions at OAR 340-041-0033(1) and (2). EPA determined that OAR 340-041-0033(3) was not a water quality standard and, therefore, did not act on that provision under Section 303(c) of the CWA (see June 1, 2010 letter from Michael A. Bussell, EPA to Neil Mullane, ODEQ, and *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*).

On June 15, 2011, the EQC revised the narrative language explaining the aquatic life criteria tables at OAR 340-041-0033. Additionally, the hardness based acute and chronic equations were added in a table below Table 20. The ODEQ submitted these revisions to the EPA for review and approval on July 21, 2011³.

² The 2007 adoption by ODEQ added the following notes to Tables 33A and 33B. Table 33A added the following: "Note: The Environmental Quality Commission adopted the following criteria on May 20, 2004 to become effective February 15, 2005. However, EPA has not yet (as of June 2006) approved the criteria. Thus, Table 33A criteria may be used in NPDES permits, but not for the section 303(d) list of impaired waters." Table 33B added the following: "Note: The Environmental Quality Commission adopted the following criteria on May 20, 2004 to become effective on EPA approval. EPA has not yet (as of June 2006) approved these criteria. The Table 33B criteria may not be used until they are approved by EPA."

³ Among other things this submittal changed the numbering of the narrative provisions as follows:

OAR 340-041-0033(1) became OAR 340-041-0033(2)
OAR 340-041-0033(2) became OAR 340-041-0033(3)
OAR 340-041-0033(3) became OAR 340-041-0033(5)

On October 17, 2011, EPA approved minor revisions to the narrative water quality standards provision at OAR 340-041-0033 (see *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*).

Today's action addresses Oregon's new and revised aquatic life water quality criteria for toxic pollutants contained in Tables 20, 33A, 33B that were submitted to EPA July 8, 2004, as revised by Oregon on April 23, 2007 and July 21, 2011⁴.

C. Summary of Actions on Specific Aquatic Life Criteria

The table below provides a summary of the actions that EPA is taking on freshwater and saltwater aquatic life criteria. This table does not address EPA's actions on new/revised introductory language, new footnotes, or any editorial/formatting changes.

Red: *disapprove*
Black: **APPROVE**
Blue: deleted (Oregon originally adopted these criteria into their water quality standards in 2004, but in 2007 Oregon inadvertently deleted these criteria from their WQS; EPA is not taking an action on these criteria).

⁴ The ODEQ proposed revisions to OAR 340-041 on June 2, 2003. The public comment period extended from June 2, 2003, through August 29, 2003. Revisions were adopted by the Oregon Environmental Quality Commission (Commission) on May 20, 2004, and filed with Oregon Secretary of State on May 28, 2004. ODEQ submitted these revisions to EPA for review and approval on July 8, 2004 along with a letter dated July 8, 2004, from Larry Knudsen, Assistant Attorney General, certifying that the revisions were adopted in accordance with Oregon State law. In 2005, ODEQ again proposed revisions to OAR 340-041. The public comment period extended from October 17, 2005 through February 6, 2006. These revisions were adopted by the Commission on February 22, 2007, and filed with Oregon Secretary of State on March 14 and 15, 2007. ODEQ submitted these revisions to EPA for review and approval on April 23, 2007. Oregon's submittal included a letter dated April 10, 2007, from Larry Knudsen, certifying that the revisions were adopted in accordance with Oregon State law. On December 15, 2010 ODEQ proposed revisions to OAR 340-041. The public comment period extended from December 21, 2010 through March 21, 2010. Revisions were adopted by the Commission on June 16, 2011, and filed with Oregon Secretary of State on July 13, 2011. DEQ submitted these revisions to EPA for review and approval on July 21, 2011. Oregon's submittal included a letter dated July 20, 2011, from Larry Knudsen, certifying that the revisions were adopted in accordance with Oregon State law.

COMPOUND	FRESHWATER		SALTWATER	
	Acute (CMC)	Chronic (CCC)	Acute (CMC)	Chronic (CCC)
Aldrin	<i>disapprove</i>	---	<i>disapprove</i>	---
Aluminum	<i>disapprove</i>	<i>disapprove</i>	---	---
Ammonia	<i>disapprove</i>	<i>disapprove</i>		
Arsenic	deleted	deleted	deleted	deleted
BHC gamma- (Lindane)	approve	<i>disapprove</i>	<i>disapprove</i>	---
Cadmium	<i>disapprove</i>	approve	approve	approve
Chlordane	<i>disapprove</i>	<i>disapprove</i>	<i>disapprove</i>	<i>disapprove</i>
Chromium (III)	approve	approve	---	---
Chromium (VI)	approve	approve	deleted	deleted
Copper	<i>disapprove</i>	<i>disapprove</i>	approve	approve
DDT 4,4'-	<i>disapprove</i>	<i>disapprove</i>	<i>disapprove</i>	<i>disapprove</i>
Dieldrin	approve	approve	<i>disapprove</i>	<i>disapprove</i>
Endosulfan	<i>disapprove</i>	<i>disapprove</i>	<i>disapprove</i>	<i>disapprove</i>
Endosulfan alpha-	<i>disapprove</i>	<i>disapprove</i>	<i>disapprove</i>	<i>disapprove</i>
Endosulfan beta-	<i>disapprove</i>	<i>disapprove</i>	<i>disapprove</i>	<i>disapprove</i>
Endrin	approve	approve	<i>disapprove</i>	<i>disapprove</i>
Heptachlor	<i>disapprove</i>	<i>disapprove</i>	<i>disapprove</i>	<i>disapprove</i>
Heptachlor Epoxide	<i>disapprove</i>	<i>disapprove</i>	<i>disapprove</i>	<i>disapprove</i>
Lead	approve	approve	approve	approve
Nickel	approve	approve	approve	approve
Pentachlorophenol	approve	approve	---	approve
Selenium	<i>disapprove</i>	<i>disapprove</i>	approve	approve
Silver	approve	approve	approve	---
Tributyltin (TBT)	approve	approve	approve	approve
Zinc	approve	approve	approve	approve

Note: “---” means a new or revised criterion was not adopted by Oregon.

II. OREGON'S FISH AND AQUATIC LIFE DESIGNATED USE AND APPLICABLE TOXICS AQUATIC LIFE CRITERIA

A. Fish and Aquatic Life Designated Use

Oregon's water quality standards regulations contain several provisions that address the designated uses in Oregon Administrative Rules (OAR) sections 340-041-0101 through 340-041-0340. The terminology Oregon uses to identify the State's aquatic life use is "Fish & Aquatic Life." Oregon has designated the fish and aquatic life use for all waters of the State. Oregon has divided its waters into 21 basins; each basin has a specific table listing the applicable designated use (*e.g.*, fish and aquatic life, irrigation, and boating).

EPA evaluated the protectiveness of Oregon's water quality criteria for the fish and aquatic life designated use.

B. Oregon's Narrative and Numeric Aquatic Life Criteria for Toxic Substances

This action addresses the new and revised criteria listed in the freshwater and saltwater columns of Tables 33A and 33B, the introductory language to tables 20, 33A, and 33B, and the footnotes associated with each table.

Since Oregon applies its numeric toxics criteria to the fish and aquatic life designated use, which includes all of the aquatic communities present in Oregon's waters, EPA evaluated Oregon's numeric toxics criteria with respect to all available acceptable toxicity tests for aquatic organisms that compose aquatic communities in Oregon.

The remainder of this document is organized as follows:

Part III of this document provides Oregon's new and revised criteria (and associated footnotes) in Table 33A and provides EPA's review and action.

Part IV of this document provides Oregon's new and revised criteria (and associated footnotes) in Table 33B and provides EPA's review and action.

Part V of this document provides Oregon's revisions to the introductory language for Table 20 and other minor editorial changes to the table and EPA's review and action on these revisions.

Enclosure 1 to this document provides Tables 20, 33A, and 33B submitted by Oregon in its July 2004 water quality standards submittal, as amended by its submissions in April 2007 and July 2011 (*Aquatic Life Criteria Submitted by Oregon in July 2004 As Amended by the April 2007 and July 2011 Water Quality Standards Submissions*)

Enclosure 2 to this document provides the *Supplemental Technical Support Document (STSD)*, which provides additional scientific and technical information supporting EPA's decision on those proposed criteria that are consistent with EPA's CWA § 304(a) recommended criteria and that EPA is approving.

Enclosure 3 to this document provides responses to supplemental comments submitted by Pacific Environmental Advocacy Center, on behalf of the Northwest Environmental Advocates, to U.S. EPA

Region 10 concerning Oregon's 2004 new and revised aquatic life criteria (*Responses to Supplemental Comments Submitted by Pacific Environmental Advocacy Center to U.S. EPA Region 10 Concerning Oregon's New and Revised Aquatic Life Criteria*).

Enclosure 4 to this document provides a summary of the aquatic life criteria in effect for CWA purposes in Tables 20, 33A, and 33B as a result of this action (*Aquatic Life Criteria In Effect for Clean Water Act Purposes*).

III. EPA’S ACTION ON THE INTRODUCTORY LANGUAGE, THE NEW AND REVISED AQUATIC LIFE CRITERIA AND THE FOOTNOTES IN TABLE 33A

A. Table 33A in Oregon’s Water Quality Standards

The following presents the introductory language to Table 33A, criteria contained in Table 33A, and new footnotes to Table 33A. Table 33A contains (1) criteria that Oregon adopted and EPA approved *prior* to the 2004 water quality standards rulemaking (i.e., these criteria were already part of Oregon’s water quality standards, and were simply moved from Table 20 to this new table), (2) new or revised criteria, and (3) new footnotes.⁵ All new language from the 2004 and 2011 revisions, including new and revised criteria, are underlined; ~~strikeout text~~ indicates the language that was removed during Oregon’s 2011 water quality standards adoption.

Table 33A

Note: The Environmental Quality Commission adopted the following criteria on May 20, 2004 to become effective February 15, 2005. However, EPA has not yet (as of June 2006) approved the criteria. Thus, Table 33A criteria may be used in NPDES permits, but not for the section 303(d) list of impaired waters.⁶

AQUATIC LIFE WATER QUALITY CRITERIA SUMMARY^A

The concentration for each compound listed in Table 33A is a criterion not to be exceeded in waters of the state in order to protect aquatic life and human health. All values are expressed as micrograms per liter (µ/L) except where noted. Compounds are listed in alphabetical order with the corresponding EPA number (from National Recommended Water Quality Criteria:2002, EPA 8220R-02-047), the Chemical Abstract Service (CAS) number, aquatic life freshwater acute and chronic criteria, aquatic life saltwater acute and chronic criteria, and human health water & organism and organism only criteria, and Drinking Water Maximum Contaminant Level (MCL). The acute criteria refer to the average concentration for one (1) hour and the chronic criteria refer to the average concentration for 96 hours (4-days), and that these criteria should not be exceeded more than once every three (3) years.

EPA No.	Compound	CAS Number	Freshwater				Saltwater				
			Acute (CMC)	Effective Date	Chronic (CCC)	Effective Date	Acute (CMC)	Effective Date	Chronic (CCC)	Effective Date	
56	Acenaphthene	83329									
57	Acenaphthylene	208968									
17	Acrolein	107028									
18	Acrylonitrile	107131									
102	Aldrin	309002	3 O	X			1.3 O	X			
1 N	Alkalinity				20,000 P						
2 N	Aluminum (pH 6.5 - 9.0)	7429905									
3 N	Ammonia	7664417					D	X	D	X	X

⁵ In Oregon’s 2004 water quality standards adoption, all of the footnotes pertaining to Table 33A and Table 33B were at the end of Table 33B. In Oregon’s 2011 water quality standards adoption, all of the footnotes located at the end of Table 33B were inserted after Table 33A. Additionally, the footnotes associated with human health criteria were then struck out (presumably to make it clear that these footnotes were being deleted because all of the human health criteria had been moved to a separate Table).

⁶ This note to Table 33A was approved by EPA in its February 18, 2011 action.

EPA No.	Compound	CAS Number	Freshwater				Saltwater			
			Acute (CMC)	Effective Date	Chronic (CCC)	Effective Date	Acute (CMC)	Effective Date	Chronic (CCC)	Effective Date
<u>58</u>	<u>Anthracene</u>	<u>120127</u>								
<u>1</u>	<u>Antimony</u>	<u>7440360</u>								
<u>2</u>	<u>Arsenic</u>	<u>7440382</u>								
<u>15</u>	<u>Asbestos</u>	<u>1332214</u>								
<u>6 N</u>	<u>Barium</u>	<u>7440393</u>								
<u>19</u>	<u>Benzene</u>	<u>71432</u>								
<u>59</u>	<u>Benzidine</u>	<u>92875</u>								
<u>60</u>	<u>Benzo(a)Anthracene</u>	<u>56553</u>								
<u>61</u>	<u>Benzo(a)Pyrene</u>	<u>50328</u>								
<u>62</u>	<u>Benzo(b)Fluoranthene</u>	<u>205992</u>								
<u>63</u>	<u>Benzo(g,h,i)Perylene</u>	<u>191242</u>								
<u>64</u>	<u>Benzo(k)Fluoranthene</u>	<u>207089</u>								
<u>3</u>	<u>Beryllium</u>	<u>7440417</u>								
<u>103</u>	<u>BHC alpha-</u>	<u>319846</u>								
<u>104</u>	<u>BHC beta-</u>	<u>319857</u>								
<u>106</u>	<u>BHC delta-</u>	<u>319868</u>								
<u>105</u>	<u>BHC gamma- (Lindane)</u>	<u>58899</u>	<u>0.95</u>		<u>0.08</u>	<u>X</u>	<u>0.16 O</u>			
<u>7 N</u>	<u>Boron</u>	<u>7440428</u>								
<u>20</u>	<u>Bromoform</u>	<u>75252</u>								
<u>69</u>	<u>Bromophenyl Phenyl Ether 4-</u>									
<u>70</u>	<u>Butylbenzyl Phthalate</u>	<u>85687</u>								
<u>4</u>	<u>Cadmium</u>	<u>7440439</u>								
<u>21</u>	<u>Carbon Tetrachloride</u>	<u>56235</u>								
<u>107</u>	<u>Chlordane</u>	<u>57749</u>	<u>2.4 O</u>	<u>X</u>	<u>0.0043 O</u>	<u>X</u>	<u>0.09 O</u>	<u>X</u>	<u>0.004 O</u>	<u>X</u>
<u>8 N</u>	<u>Chloride</u>	<u>16887006</u>	<u>860000</u>		<u>230000</u>					
<u>9 N</u>	<u>Chlorine</u>	<u>7782505</u>	<u>19</u>	<u>X</u>	<u>11</u>	<u>X</u>	<u>13</u>	<u>X</u>	<u>7.5</u>	<u>X</u>
<u>22</u>	<u>Chlorobenzene</u>	<u>108907</u>								
<u>23</u>	<u>Chlorodibromomethane</u>	<u>124481</u>								
<u>24</u>	<u>Chloroethane</u>	<u>75003</u>								
<u>65</u>	<u>ChloroethoxyMethane Bis2-</u>	<u>111911</u>								
<u>66</u>	<u>ChloroethylEther Bis2-</u>	<u>111444</u>								
<u>25</u>	<u>Chloroethylvinyl Ether 2-</u>	<u>110758</u>								
<u>26</u>	<u>Chloroform</u>	<u>67663</u>								
<u>67</u>	<u>ChloroisopropylEther Bis2-</u>	<u>108601</u>								
<u>15 N</u>	<u>ChloromethylEther, Bis</u>	<u>542881</u>								
<u>71</u>	<u>Chloronaphthalene 2-</u>	<u>91587</u>								
<u>45</u>	<u>Chlorophenol 2-</u>	<u>95578</u>								
<u>10 N</u>	<u>Chlorophenoxy Herbicide (2,4,5,-TP)</u>	<u>93721</u>								
<u>11 N</u>	<u>Chlorophenoxy Herbicide (2,4-D)</u>	<u>94757</u>								
<u>72</u>	<u>Chlorophenyl Phenyl Ether 4-</u>	<u>7005723</u>								
<u>12 N</u>	<u>Chloropyrifos</u>	<u>2921882</u>	<u>0.083</u>	<u>X</u>	<u>0.041</u>	<u>X</u>	<u>0.011</u>	<u>X</u>	<u>0.0056</u>	<u>X</u>
<u>5a</u>	<u>Chromium (III)</u>									
<u>5b</u>	<u>Chromium (VI)</u>	<u>18540299</u>								
<u>73</u>	<u>Chrysene</u>	<u>218019</u>								
<u>6</u>	<u>Copper</u>	<u>7440508</u>								

EPA No.	Compound	CAS Number	Freshwater				Saltwater			
			Acute (CMC)	Effective Date	Chronic (CCC)	Effective Date	Acute (CMC)	Effective Date	Chronic (CCC)	Effective Date
14	Cyanide	57125	22 S	X	5.2 S	X	1 S	X	1 S	X
108	DDT 4,4'-	50293	1.1 O.T	X	0.001 O.T	X	0.13 O.T	X	0.001 O.T	X
109	DDE 4,4'-	72559								
110	DDD 4,4'-	72548								
14 N	Demeton	8065483			0.1	X			0.1	X
74	Dibenzo(a,h)Anthracene	53703								
75	Dichlorobenzene 1,2-	95501								
76	Dichlorobenzene 1,3-	541731								
77	Dichlorobenzene 1,4-	106467								
78	Dichlorobenzidine 3,3'-	91941								
27	Dichlorobromomethane	75274								
28	Dichloroethane 1,1-	75343								
29	Dichloroethane 1,2-	107062								
30	Dichloroethylene 1,1-	75354								
46	Dichlorophenol 2,4-	120832								
31	Dichloropropane 1,2-	78875								
32	Dichloropropene 1,3-	542756								
111	Dieldrin	60571	0.24				0.71 O	X	0.0019 O	X
79	DiethylPhthalate	84662								
47	Dimethylphenol 2,4-	105679								
80	DimethylPhthalate	131113								
81	Di-n-Butyl Phthalate	84742								
49	Dinitrophenol 2,4-	51285								
27 N	Dinitrophenols	25550587								
82	Dinitrotoluene 2,4-	121142								
83	Dinitrotoluene 2,6-	606202								
84	Di-n-Octyl Phthalate	117840								
16	Dioxin (2,3,7,8-TCDD)	1746016								
85	Diphenylhydrazine 1,2-	122667								
68	EthylhexylPhthalate Bis2-	117817								
	Endosulfan		0.22 I.P	X	0.056 I.P	X	0.034 I.P	X	0.0087 I.P	X
112	Endosulfan alpha-	959988	0.22 O		0.056 O		0.034 O		0.0087 O	
113	Endosulfan beta-	33213659	0.22 O		0.056 O		0.034 O		0.0087 O	
114	Endosulfan Sulfate	1031078							0.0023 O	
115	Endrin	72208	0.086				0.037 O		0.0023 O	
116	Endrin Aldehyde	7421934								
33	Ethylbenzene	100414								
86	Fluoranthene	206440								
87	Fluorene	86737								
17 N	Guthion	86500			0.01	X			0.01	X
117	Heptachlor	76448	0.52 O	X	0.0038 O	X	0.053 O	X	0.0036 O	X
118	Heptachlor Epoxide	1024573	0.52 O		0.0038 O		0.053 O		0.0036 O	
88	Hexachlorobenzene	118741								

EPA No.	Compound	CAS Number	Freshwater				Saltwater			
			Acute (CMC)	Effective Date	Chronic (CCC)	Effective Date	Acute (CMC)	Effective Date	Chronic (CCC)	Effective Date
89	Hexachlorobutadiene	87683								
91	Hexachloroethane	67721								
19 N	Hexachlorocyclo-hexane- Technical	319868								
90	Hexachlorocyclopentadiene	77474								
92	Ideno1,2,3-(cd)Pyrene	193395								
20 N	Iron	7439896			1,000	X				
93	Isophorone	78591								
7	Lead	7439921								
21 N	Malathion	121755			0.1	X		0.1	X	
22 N	Manganese	7439965								
8a	Mercury	7439976	2.4	X	0.012	X	2.1	X	0.025	X
23 N	Methoxychlor	72435			0.03	X			0.03	X
34	Methyl Bromide	74839								
35	Methyl Chloride	74873								
48	Methyl-4,6-Dinitrophenol 2-	534521								
52	Methyl-4-Chlorophenol 3-	59507								
36	Methylene Chloride	75092								
8b	Methylmercury	22967926								
24 N	Mirex	2385855			0.001	X		0.001	X	
94	Naphthalene	91203								
9	Nickel	7440020								
25 N	Nitrates	14797558								
95	Nitrobenzene	98953								
50	Nitrophenol 2-	88755								
51	Nitrophenol 4-	100027								
26 N	Nitrosamines	35576911								
28 N	Nitrosodibutylamine,N	924163								
29 N	Nitrosodiethylamine,N	55185								
96	N-Nitrosodimethylamine	62759								
98	N-Nitrosodiphenylamine	86306								
30 N	Nitrosopyrrolidine,N	930552								
97	N-Nitrosodi-n-Propylamine	621647								
32 N	Oxygen, Dissolved	7782447								
33 N	Parathion	56382	0.065	X	0.013	X				
119	Polychlorinated Biphenyls PCBs:	1336363	2 U	X	0.014 U	X	10 U	X	0.03 U	X
34 N	Pentachlorobenzene	608935								
53	Pentachlorophenol	87865	M				13		7.9	
99	Phenanthrene	85018								
54	Phenol	108952								
36 N	Phosphorus Elemental	7723140						0.1		
100	Pyrene	129000								
10	Selenium	7782492								
11	Silver	7440224								
40 N	Sulfide-Hydrogen Sulfide	7783064			2	X		2	X	
43 N	Tetrachlorobenzene,1,2,4,5	95943								
37	Tetrachloroethane 1,1,2,2-	79345								

EPA No.	Compound	CAS Number	Freshwater				Saltwater			
			Acute (CMC)	Effective Date	Chronic (CCC)	Effective Date	Acute (CMC)	Effective Date	Chronic (CCC)	Effective Date
38	Tetrachloroethylene	127184								
12	Thallium	7440280								
39	Toluene	108883								
120	Toxaphene	8001352	0.73	X	0.0002	X	0.21	X	0.0002	X
40	Trans-Dichloroethylene 1,2-	156605								
44 N	Tributyltin (TBT)	688733								
101	Trichlorobenzene 1,2,4-	120821								
41	Trichloroethane 1,1,1-	71556								
42	Trichloroethane 1,1,2-	79005								
43	Trichloroethylene	79016								
45 N	Trichlorophenol 2,4,5	95954								
55	Trichlorophenol 2,4,6-	88062								
44	Vinyl Chloride	75014								
13	Zinc	7440666								

Footnotes for Table 33A and 33B:

- A Values in Table 20 are applicable to all basins.
- B ~~Human Health criteria values were calculated using a fish consumption rate of 17.5 grams per day (0.6 ounces/day) unless otherwise noted.~~
- C Ammonia criteria for freshwater may depend on pH, temperature, and the presence of salmonids or other fish with ammonia-sensitive early life stages. Values for freshwater criteria (of total ammonia nitrogen in mg N/L) can be calculated using the formulae specified in *1999 Update of Ambient Water Quality Criteria for Ammonia* (EPA-822-R-99-014; <http://www.epa.gov/ost/standards/ammonia/99update.pdf>):
- Freshwater Acute:
- $$\text{salmonids present...CMC} = \frac{0.275}{1 + 10^{7.204 - \text{pH}}} + \frac{39.0}{1 + 10^{\text{pH} - 7.204}}$$
- $$\text{salmonids not present...CMC} = \frac{0.411}{1 + 10^{7.204 - \text{pH}}} + \frac{58.4}{1 + 10^{\text{pH} - 7.204}}$$
- Freshwater Chronic:
- fish early life stages present:
- $$\text{CCC} = \frac{0.0577}{1 + 10^{7.688 - \text{pH}}} + \frac{2.487}{1 + 10^{\text{pH} - 7.688}} * \text{MIN}(2.85, 1.45 * 10^{0.028 * (25 - T)})$$
- fish early life stages not present:
- $$\text{CCC} = \frac{0.577}{1 + 10^{7.688 - \text{pH}}} + \frac{2.487}{1 + 10^{\text{pH} - 7.688}} * 1.45 * 10^{0.028 * (25 - \text{MAX}(T, 7))}$$
- Note: these chronic criteria formulae would be applied to calculate the 30-day average concentration limit; in addition, the highest 4-day average within the 30-day period should not exceed 2.5 times the CCC.
- D Ammonia criteria for saltwater may depend on pH and temperature. Values for saltwater criteria (total ammonia) can be calculated from the tables specified in *Ambient Water Quality Criteria for Ammonia (Saltwater)--1989* (EPA 440/5-88-004; <http://www.epa.gov/ost/pc/ambientwqc/ammoniasalt1989.pdf>).
- E Freshwater and saltwater criteria for metals are expressed in terms of “dissolved” concentrations in the water column, except where otherwise noted (e.g. aluminum).
- F The freshwater criterion for this metal is expressed as a function of hardness (mg/L) in the water column. Criteria values for hardness may be calculated from the following formulae (CMC refers to Acute Criteria; CCC refers to Chronic Criteria):

$$CMC = (\exp(m_A * [\ln(\text{hardness})] + b_A)) * CF$$

$$CCC = (\exp(m_C * [\ln(\text{hardness})] + b_C)) * CF$$

where CF is the conversion factor used for converting a metal criterion expressed as the total recoverable fraction in the water column to a criterion expressed as the dissolved fraction in the water column.

<u>Chemical</u>	<u>m_A</u>	<u>b_A</u>	<u>m_C</u>	<u>b_C</u>
<u>Cadmium</u>	<u>1.0166</u>	<u>-3.924</u>	<u>0.7409</u>	<u>-4.719</u>
<u>Chromium III</u>	<u>0.8190</u>	<u>3.7256</u>	<u>0.8190</u>	<u>0.6848</u>
<u>Copper</u>	<u>0.9422</u>	<u>-1.700</u>	<u>0.8545</u>	<u>-1.702</u>
<u>Lead</u>	<u>1.273</u>	<u>-1.460</u>	<u>1.273</u>	<u>-4.705</u>
<u>Nickel</u>	<u>0.8460</u>	<u>2.255</u>	<u>0.8460</u>	<u>0.0584</u>
<u>Silver</u>	<u>1.72</u>	<u>-6.59</u>		
<u>Zinc</u>	<u>0.8473</u>	<u>0.884</u>	<u>0.8473</u>	<u>0.884</u>

Conversion factors (CF) for dissolved metals (the values for total recoverable metals criteria were multiplied by the appropriate conversion factors shown below to calculate the dissolved metals criteria):

<u>Chemical</u>	<u>Freshwater</u>		<u>Saltwater</u>	
	<u>Acute</u>	<u>Chronic</u>	<u>Acute</u>	<u>Chronic</u>
<u>Arsenic</u>	<u>1.000</u>	<u>1.000</u>	<u>1.000</u>	<u>1.000</u>
<u>Cadmium</u>	<u>1.136672-[ln hardness)(0.041838)]</u>	<u>1.101672-[ln hardness)(0.041838)]</u>	<u>0.994</u>	<u>0.994</u>
<u>Chromium III</u>	<u>0.316</u>	<u>0.860</u>	<u>--</u>	<u>--</u>
<u>Chromium VI</u>	<u>0.982</u>	<u>0.962</u>	<u>0.993</u>	<u>0.993</u>
<u>Copper</u>	<u>0.960</u>	<u>0.960</u>	<u>0.83</u>	<u>0.83</u>
<u>Lead</u>	<u>1.46203-[ln hardness)(0.145712)]</u>	<u>1.46203-[ln hardness)(0.145712)]</u>	<u>0.951</u>	<u>0.951</u>
<u>Nickel</u>	<u>0.998</u>	<u>0.997</u>	<u>0.990</u>	<u>0.990</u>
<u>Selenium</u>	<u>0.996</u>	<u>0.922</u>	<u>0.998</u>	<u>0.998</u>
<u>Silver</u>	<u>0.85</u>	<u>0.85</u>	<u>0.85</u>	<u>--</u>
<u>Zinc</u>	<u>0.978</u>	<u>0.986</u>	<u>0.946</u>	<u>0.946</u>

~~G Human Health criterion is the same as originally published in the 1976 EPA Red Book (Quality Criteria for Water, EPA 440/9-76-023) which predates the 1980 methodology and did not use a fish ingestion BCF approach.~~

~~H This value is based on a Drinking Water regulation.~~

~~I This value is based on criterion published in Ambient Water Quality Criteria for Endosulfan (EPA 440/5-80-046) and should be applied as the sum of alpha and beta endosulfan.~~

~~J No BCF was available; therefore, this value is based on that published in the 1986 EPA Gold Book.~~

~~K Human Health criterion is for "dissolved concentration based on the 1976 EPA Red Book conclusion that adverse effects from exposure at this level are aesthetic rather than toxic.~~

~~L This value is expressed as the fish tissue concentration of methylmercury.~~

~~M Freshwater aquatic life values for pentachlorophenol are expressed as a function of pH, and are calculated as follows: CMC=(exp(1.005(pH)-4.869); CCC=exp(1.005(pH)-5.134).~~

~~N This number was assigned to the list of non-priority pollutants in National Recommended Water Quality Criteria: 2002 (EPA-822-R-02-047).~~

~~O This criterion is based on EPA recommendations issued in 1980 that were derived using guidelines that differed from EPA's 1985 Guidelines for minimum data requirements and derivation procedures. For example, a "CMC" derived using the 1980 Guidelines was derived to be used as an instantaneous maximum. If assessment is to be done using an averaging period, the values given should be divided by 2 to obtain a value that is more comparable to a CMC derived using the 1985 Guidelines.~~

~~P Criterion shown is the minimum (i.e. CCC in water should not be below this value in order to protect aquatic life).~~

~~Q Criterion is applied as total arsenic (i.e. arsenic (III) + arsenic (V)).~~

~~R Arsenic criterion refers to the inorganic form only.~~

<u>S</u>	<u>This criterion is expressed as μg free cyanide (CN)/L.</u>
<u>T</u>	<u>This criterion applies to DDT and its metabolites (i.e. the total concentration of DDT and its metabolites should not exceed this value).</u>
<u>U</u>	<u>This criterion applies to total PCBs (e.g. the sum of all congener or all isomer or homolog or Arochlor analyses).</u>
<u>V</u>	<u>The $\text{CMC} = 1 / [(f1/\text{CMC1}) + (f2/\text{CMC2})]$ where f1 and f2 are the fractions of total selenium that are treated as selenite and selenate, respectively, and CMC1 and CMC2 are 185.9 $\mu\text{g/L}$ and 12.82 $\mu\text{g/L}$, respectively.</u>
<u>W</u>	<u>The acute and chronic criteria for aluminum are 750 $\mu\text{g/L}$ and 87 $\mu\text{g/L}$, respectively. These values for aluminum are expressed in terms of “total recoverable” concentration of metal in the water column. The criterion applies at $\text{pH} < 6.6$ and hardness $< 12 \text{ mg/L}$ (as CaCO_3).</u>
<u>X</u>	<u>The effective date for the criterion in the column immediately to the left is 1991.</u>
<u>Y</u>	<u>No criterion</u>

B. EPA’s CWA Determinations on Table 33A

1. EPA’s Action on Introductory Language to Table 33A

This section of the document addresses the introductory language to Table 33A. The introductory language states:

The concentration for each compound listed in Table 33A is a criterion not to be exceeded in waters of the state in order to protect aquatic life and human health. All values are expressed as micrograms per liter ($\mu\text{g/L}$) except where noted. Compounds are listed in alphabetical order with the corresponding EPA number (from National Recommended Water Quality Criteria:2002, EPA 8220R-02-047), the Chemical Abstract Service (CAS) number, aquatic life freshwater acute and chronic criteria, aquatic life saltwater acute and chronic criteria, ~~human health water & organisms and organisms only, and Drinking Water Maximum Contaminant Level (MCL)~~. The acute criteria refer to the average concentration for one (1) hour and the chronic criteria refer to the average concentration for 96 hours (4-days), and that these criteria should not be exceeded more than once every three (3) years.

EPA Action

In accordance with its Clean Water Act authority, 33 U.S.C § 1313(c)(3) and 40 CFR § Part 131, EPA approves the introductory language for Table 33A.

EPA Rationale

The introductory language to the table provides the frequency and duration for each aquatic life criterion (i.e., acute criterion is expressed as a one hour average not to be exceeded more than once every three years, and the chronic criterion is expressed as a four day average not to be exceeded more than once every three years), requires waters of the State not to exceed the criterion, describes the units used for each chemical, and describes the organization of the table. Additionally, references to human health criteria were deleted from the introductory language because in Oregon’s 2011 adoption of the human health criteria, Table 40 was created and provides all of the human health criteria.

The federal regulation at 40 CFR § 131.11(b) states that in establishing criteria, states should set numerical values based on EPA’s 304(a) recommendations (potentially modified to reflect site-specific conditions) or other scientifically defensible methods. EPA’s 304(a) recommendations generally consist of a magnitude (level of pollutant that is allowable, usually expressed as a

concentration), duration (the period of time over which the instream concentration is averaged for comparison with criteria concentrations), and frequency (how often a particular criterion can be exceeded). The introductory language specifies a reasonable duration and frequency to be used for the magnitudes listed in the table that follows; therefore, EPA is approving this language. EPA’s specific determinations on the adequacy of the magnitude for each new or revised criterion to protect Oregon’s fish and aquatic life designated use, given the specified duration and frequency, are provided below.

EPA approves the language stating “The concentration for each compound listed in Table 33A is a criterion not to be exceeded in water of the state in order to protect aquatic life.” This language describes the intent of the criteria to protect aquatic life uses in Oregon in waters of the state. As stated above, EPA’s action on each individual criterion in Table 33A is provided below.

Additionally, EPA acknowledges the editorial changes made by removing references to human health criteria in the introductory language. EPA approves these changes as non-substantive editorial changes.

2. Approval Action for New or Revised Aquatic Life Criteria in Table 33A (BHC-gamma (Lindane), Dieldrin, Endrin, Pentachlorophenol)

This section of the document addresses new and revised aquatic life criteria adopted by Oregon that EPA is approving. As explained in the introductory language to Table 33A, acute criteria are expressed as a one-hour average not to be exceeded more than once every three years. The chronic criteria are expressed as a four-day average concentration not to be exceeded more than once every three years. Specifically, this section provides EPA’s action on the following criteria:

BHC-gamma (Lindane):	freshwater acute:	0.95 µg/L
Dieldrin:	freshwater acute:	0.24 µg/L
Endrin:	freshwater acute:	0.086 µg/L
Pentachlorophenol:	saltwater chronic:	7.9 µg/L

The freshwater acute criterion for pentachlorophenol is a pH dependent equation and is found in Footnote M of Table 33A. The acute criterion is:

Pentachlorophenol:	freshwater acute:	$\exp(1.005(\text{pH}) - 4.869)$ expressed in µg/L
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EPA Action

In accordance with its Clean Water Act authority, 33 U.S.C § 1313(c)(3) and 40 CFR § 131, EPA approves the magnitude (including the formula for pentachlorophenol found in Footnote M of Table 33A), frequency, and duration of the aquatic life toxic criteria referenced above.

EPA Rationale

EPA evaluated each of the criteria referenced above to determine whether they will protect Oregon's fish and aquatic life designated use. A detailed description of the methodology for evaluating criteria is contained in the STSD in Enclosure 2 (see Section 1.0 Methodology for Criterion Evaluation). The data and evaluation used to determine if each of the above criteria protects Oregon's fish and aquatic life designated use is also contained in the STSD in Enclosure 2 (see Section 2.0).

3. Disapproval Action for Changes to Aquatic Life Criteria Moved From Table 20 to Table 33A (Aldrin, BHC-gamma (Lindane), Chlordane, DDT 4,4, Dieldrin, Endosulfan, Endrin, and Heptachlor)

This section addresses the following aquatic life criteria:

Aldrin:	freshwater acute:	3 µg/L
	saltwater acute:	1.3 µg/L
BHC-gamma (Lindane):	freshwater chronic:	0.08 µg/L
	saltwater acute:	0.16 µg/L
Chlordane:	freshwater acute:	2.4 µg/L
	freshwater chronic:	0.0043 µg/L
	saltwater acute:	0.09 µg/L
	saltwater chronic:	0.004 µg/L
DDT 4,4:	freshwater acute:	1.1 µg/L
	freshwater chronic:	0.001 µg/L
	saltwater acute:	0.13 µg/L
	saltwater chronic:	0.001 µg/L
Dieldrin:	saltwater acute:	0.71 µg/L
	saltwater chronic:	0.0019 µg/L
Endosulfan:	freshwater acute:	0.22 µg/L
	freshwater chronic:	0.056 µg/L
	saltwater acute:	0.34 µg/L
	saltwater chronic:	0.0087 µg/L
Endrin:	saltwater acute:	0.037 µg/L
	saltwater chronic:	0.0023 µg/L
Heptachlor:	freshwater acute:	0.52 µg/L
	freshwater chronic:	0.0038 µg/L
	saltwater acute:	0.053 µg/L
	saltwater chronic:	0.0036 µg/L

There are several changes that affect these criteria. First, the magnitudes for these criteria were moved from Table 20 to Table 33A. Second, the duration and frequency associated with these magnitudes were changed. These changes are reflected in two places: altered introductory language to Table 20, and new introductory language in the new Table 33A. The revised introductory language to Table 20, and the new introductory language to Table 33A, both provide that acute criteria in the respective tables are expressed as a one-hour average concentration not to be exceeded more than once every three years, and chronic criteria in the tables are expressed as a four-day average concentration not to be exceeded more than once every three years. This is a change from the prior introductory language in Table 20, which stated that "...Specific descriptions of each compound and an explanation of values are included in Quality Criteria for Water (1986)...." EPA's *Quality Criteria for Water (1986)* provides that the acute criteria were maximum values not to be exceeded (at any frequency), and the chronic criteria were 24-hour averages not to be exceeded (at any frequency). Oregon's new introductory language had the effect of changing the duration and frequency of the criteria.

EPA Action

In accordance with its Clean Water Act authority, 33 U.S.C § 1313(c)(3) and 40 CFR § 131, EPA disapproves the frequency and duration changes referenced above. Thus, for the pesticide criteria listed above, EPA disapproves the deletion of the appropriate duration and frequency introductory language from Table 20, and disapproves the addition of the magnitudes to Table 33A. EPA's related disapproval of the introductory language to Table 20 is described in Part V.A. of this document, and EPA's approval of the introductory language to Table 33A (which no longer applies to the pesticide criteria listed in this Section) is described in Part III.B.1.

EPA Rationale

EPA has reviewed the magnitude, duration, and frequency for the above referenced chemicals. Prior to Oregon's 2004 water quality standards adoption, Oregon's water quality standards contained criteria for the chemicals referenced above; the magnitude, duration, and frequency for the criteria, prior to the 2004 revisions, were consistent with EPA's 304(a) recommendations.

In Oregon's 2004 adoption, Oregon retained the magnitude for each of the above referenced chemicals but, as a result of the new introductory language, Oregon effectively revised the frequency and duration for each criterion. Oregon's 2004 adoption made the following changes:

- 1) Oregon's new introductory language had the effect of changing the duration and frequency for the acute criteria from a maximum value not to be exceeded, to a one-hour average not to be exceeded more than once every three years; and
- 2) Oregon's new introductory language had the effect of changing the duration and frequency for the chronic criteria from a 24-hour average, to a four-day average not to be exceeded more than once every three years.

While the EPA's 304(a) acute criteria recommendations contemplate the potential use of a one-hour averaging period for the above chemicals, in that case they would also provide for the criterion value to be halved (e.g., the 304(a) acute criterion for aldrin is a "not to be exceeded value" of 3.0 µg/L; if a one-hour averaging period is used the recommended acute criterion would be 1.5 µg/L).

Though EPA approved the magnitudes for these chemicals at the durations and frequencies provided in Oregon's WQS prior to 2004, with the new durations and frequencies, the unchanged (i.e. not halved) magnitudes for these criteria may no longer be protective. Oregon did not provide supporting documentation that would demonstrate that the designated aquatic life uses in Oregon are ensured protection from discharges of the above referenced chemicals at the specified magnitude, duration, and frequency. Therefore, EPA is disapproving the change in the durations and frequencies of these criteria by disapproving the new introductory language in Table 20 and the transfer of these magnitudes to Table 33A.

Remedies to Address EPA's Disapproval

Oregon must revise the frequency and duration to be consistent with EPA's 304(a) recommendations for the above referenced chemicals to protect aquatic life. Oregon may do this using one of the following methods:

- Move the magnitudes for each chemical to Table 33A as proposed, and modify the introductory language to Table 33A to provide that the acute magnitude is expressed as a maximum value not to be exceeded and the chronic criterion is expressed as a 24-hour maximum for the chemicals listed above.
- Modify Table 33A in an alternate way that is consistent with EPA's 304(a) recommendations.
- Leave the magnitudes in Table 20, and fix the introductory language to provide that the acute magnitude is expressed as a maximum value not to be exceeded and the chronic criterion is expressed as a 24-hour maximum for the chemicals listed above. Do not include the magnitudes in Table 33A.
- Development of Oregon-specific numeric criteria using a sound scientific methodology.

Freshwater and Saltwater Aquatic Life Criteria Currently in Effect in Oregon

As explained above, EPA is disapproving the addition of the magnitudes in Table 33A for these chemicals because of the new duration and frequency specified in Table 33A. This leaves the same magnitude in effect in Table 20, where these magnitudes are subject to the former duration and frequency that were approved and appropriate for these magnitudes. The acute criteria are expressed as a maximum value not to be exceeded and the chronic criterion is a 24-hour maximum, the numeric values are listed below:

Aldrin:	freshwater acute:	3 µg/L
	saltwater acute :	1.3 µg/L
Lindane:	freshwater chronic:	0.08 µg/L
	saltwater acute:	0.16 µg/L
Chlordane:	freshwater acute:	2.4 µg/L
	freshwater chronic:	0.0043 µg/L
	saltwater acute:	0.09 µg/L
	saltwater chronic;	0.004 µg/L

DDT 4,4:	freshwater acute:	1.1 µg/L
	freshwater chronic:	0.001 µg/L
	saltwater acute:	0.13 µg/L
	saltwater chronic:	0.001 µg/L
Dieldrin:	saltwater acute:	0.71 µg/L
	saltwater chronic:	0.0019 µg/L
Endrin:	saltwater acute:	0.037 µg/L
	saltwater chronic:	0.0023 µg/L
Heptachlor:	freshwater acute:	0.52 µg/L
	freshwater chronic:	0.0038 µg/L
	saltwater acute:	0.053 µg/L
	saltwater chronic:	0.0036 µg/L
Endosulfan:	freshwater acute:	0.22 µg/L
	freshwater chronic:	0.056 µg/L
	saltwater acute:	0.34 µg/L
	saltwater chronic:	0.0087 µg/L

4. Disapproval Action for New Criteria in Table 33A (Endosulfan alpha, Endosulfan beta, and Heptachlor epoxide)

This section of the document addresses new criteria for chemicals that Oregon has adopted and EPA is disapproving. As a result of the introductory language to Table 33A, acute criteria are expressed as a one-hour average not to be exceeded more than once every three years, and the chronic criteria are expressed as a four-day average concentration not to be exceeded more than once every three years. Specifically, this section provides EPA's action on the following aquatic life criteria:

Endosulfan-alpha:	freshwater acute:	0.22 µg/L
	freshwater chronic:	0.056 µg/L
	saltwater acute:	0.34 µg/L
	saltwater chronic;	0.0087 µg/L
Endosulfan-beta:	freshwater acute;	0.22 µg/L
	freshwater chronic:	0.056 µg/L
	saltwater acute:	0.34 µg/L
	saltwater chronic:	0.0087 µg/L
Heptachlor Epoxide:	freshwater acute:	0.52 µg/L
	freshwater chronic:	0.0038 µg/L
	saltwater acute;	0.053 µg/L
	saltwater chronic:	0.0036 µg/L

EPA Action

In accordance with its Clean Water Act authority, 33 U.S.C § 1313(c)(3) and 40 CFR § 131, EPA disapproves all of the above referenced criteria. Specifically, the one-hour averaging periods associated with the acute aquatic life criteria described above and the four-day averaging period associated with the chronic aquatic life criteria are not appropriate averaging periods for these magnitudes.

EPA Rationale

EPA's 304(a) recommendations express the acute criterion as a maximum value not to be exceeded, and the chronic criterion is expressed as a 24-hour average. However, as a result of Oregon's introductory language to Table 33A the acute criteria are expressed as a one-hour average not to be exceeded more than once every three years, and the chronic criteria are expressed as a four-day average concentration not to be exceeded more than once every three years.

The acute criterion may be used with a one-hour averaging period for the above chemicals, however, the criterion value must be halved (e.g., the 304(a) acute criterion for endosulfan alpha is a "not to be exceeded value" of 0.22 µg/L; if a one-hour averaging period is used the acute criterion must be 0.11 µg/L).

Oregon did not provide supporting documentation that would demonstrate that the designated aquatic life uses in Oregon are ensured protection from discharges of the above referenced chemicals at the specified magnitude, duration, and frequency. Therefore, EPA is disapproving the above referenced magnitudes.

Remedies to Address EPA's Disapproval

Oregon must adopt frequency and durations to be consistent with EPA's 304(a) recommendations for the above referenced chemicals to protect aquatic life. Oregon may do this using one of the following methods:

- Retain the magnitude for each chemical, and modify the introductory language to Table 33A to make it clear that the acute criterion is a magnitude not to be exceeded and the chronic criterion is a 24-hour maximum.
- Modify the table in an alternate way that is consistent with EPA's 304(a) recommendations.
- Develop Oregon-specific numeric criteria using a sound scientific methodology.

Freshwater and Saltwater Aquatic Life Criteria Currently in Effect in Oregon

Until EPA approves or promulgates revisions to numeric freshwater and saltwater acute and chronic aquatic life criteria for endosulfan alpha, endosulfan beta, and heptachlor epoxide, the narrative criterion (OAR 340-042-0033(2)) is applicable to the designated aquatic life uses in Oregon for CWA purposes.

5. EPA's Action on Footnotes in Table 33A

This section of the document addresses the footnotes in Table 33A. In 2004 the footnotes for Tables 33A and 33B were all located *after* Table 33B. In 2011, Oregon added Footnotes A through Y after

Table 33A, but subsequently eliminated Footnotes B, G, H, J – L, and R because a number of criteria moved to a different table. Each footnote adopted by Oregon is denoted in italics.

Footnote A

A Values in Table 20 are applicable to all basins.

EPA Action

In accordance with its Clean Water Act authority, 33 U.S.C § 1313(c)(3) and 40 CFR § 131, EPA is disapproving this footnote because it directs the reader to the incorrect table. Oregon has explained to EPA that this is an error and Oregon intends to correct the footnote to read “Values in Table 33A are applicable to all basins” (see October 3, 2012 letter from Greg Aldrich, ODEQ to Daniel Opalski, EPA).

Remedy to Disapproval Language

Change the text in the footnote to “Values in Table 33A are applicable to all basins.”

Narrative Language Currently in Effect in Oregon

OAR 340-041-0033(3) has been approved by EPA and is in effect for CWA purposes; it states: “Levels of toxic substances in waters of the state may not exceed the applicable aquatic life criteria listed in Tables 20, 33A, and 33B....” This language correctly requires the aquatic life criteria in Table 33A to be applied to all waters of the state.

Footnote C

C Ammonia criteria for freshwater may depend on pH, temperature, and the presence or absence of salmonids or other fish with ammonia-sensitive early life stages. Values for freshwater criteria (of total ammonia nitrogen in mg N/L) can be calculated using the formulae specified in 1999 Update of Ambient Water Quality Criteria for Ammonia (EPA-822-R-99-014; <http://www.epa.gov/ost/standards/ammonia/99update.pdf>):

Freshwater Acute:

$$\text{salmonids present....CMC} = \frac{0.275}{1 + 10^{7.204-pH}} + \frac{39.0}{1 + 10^{pH-7.204}}$$

$$\text{salmonids not present...CMC} = \frac{0.411}{1 + 10^{7.204-pH}} + \frac{58.4}{1 + 10^{pH-7.204}}$$

Freshwater Chronic:

fish early life stages present:

$$CCC = \frac{0.0577}{1 + 10^{7.688-pH}} + \frac{2.487}{1 + 10^{pH-7.688}} * MIN(2.85, 1.45 * 10^{0.028*(25-T)})$$

fish early life stages not present:

$$CCC = \frac{0.577}{1 + 10^{7.688-pH}} + \frac{2.487}{1 + 10^{pH-7.688}} * 1.45 * 10^{0.028*(25-MAX(T,7))}$$

Note: these chronic criteria formulae would be applied to calculate the 30-day average concentration limit; in addition, the highest 4-day average within the 30-day period should not exceed 2.5 times the CCC.

EPA Action

This footnote is not applicable to any criteria in Table 33A because there is no citation to this footnote anywhere in Table 33A. Additionally, Footnote C to Table 33B sets forth the same criteria for ammonia that are described above, and Footnote C is cited in Table 33B. Therefore, EPA's decision regarding these criteria is set forth below in Parts IV.B.4.b (Freshwater Acute and Chronic Ammonia Aquatic Life Criteria), and IV.B.5 (EPA's Action on the New Footnotes in Table 33B), Footnote C.

EPA recommends the State delete this footnote from Table 33A since there is no citation to the footnote in Table 33A.

Footnote D

D Ammonia criteria for saltwater may depend on pH and temperature. Values for saltwater criteria total ammonia) can be calculated from the tables specified in Ambient Water Quality Criteria for Ammonia (Saltwater)--1989 (EPA 440/5-88-004; <http://www.epa.gov/ost/pc/ambientwqc/ammoniasalt1989.pdf>.

EPA Action

In accordance with its Clean Water Act authority, 33 U.S.C § 1313(c)(3) and 40 CFR § 131, EPA is approving Footnote D as a non-substantive formatting change. Prior to the 2004 water quality standards adoption, the saltwater ammonia criteria were contained in Table 20 and referenced the same criterion document. Oregon retained the same saltwater ammonia criteria and moved them to Table 33A. Footnote D directs the reader to the same EPA document which contains the unchanged saltwater ammonia criteria.

Please note that the internet address has changed since this table was created and should be updated. The current address is: <http://water.epa.gov/scitech/swguidance/standards/criteria/current/index.cfm>.

Footnotes E and F

- E Freshwater and saltwater criteria for metals are expressed in terms of "dissolved" concentrations in the water column, except where otherwise noted (e.g. aluminum).*
- F The freshwater criterion for this metal is expressed as a function of hardness (mg/L) in the water column. Criteria values for hardness may be calculated from the following formulae (CMC refers to Acute Criteria; CCC refers to Chronic Criteria):*

$$\begin{aligned} CMC &= (\exp(m_A * [\ln(\text{hardness})] + b_A)) * CF \\ CCC &= (\exp(m_C * [\ln(\text{hardness})] + b_C)) * CF \end{aligned}$$

where CF is the conversion factor used for converting a metal criterion expressed as the total water column.

Chemical	m_A	b_A	m_C	b_C
<i>Cadmium</i>	1.0166	-3.924	0.7409	-4.719
<i>Chromium III</i>	0.8190	3.7256	0.8190	0.6848
<i>Copper</i>	0.9422	-1.700	0.8545	-1.702
<i>Lead</i>	1.273	-1.460	1.273	-4.705
<i>Nickel</i>	0.8460	2.255	0.8460	0.0584
<i>Silver</i>	1.72	-6.59		
<i>Zinc</i>	0.8473	0.884	0.8473	0.884

Conversion factors (CF) for dissolved metals (the values for total recoverable metals criteria were multiplied by the appropriate conversion factors shown below to calculate the dissolved metals criteria):

Chemical	Freshwater		Saltwater	
	Acute	Chronic	Acute	Chronic
<i>Arsenic</i>	1.000	1.000	1.000	1.000
<i>Cadmium</i>	$1.136672 - [(\ln \text{hardness})(0.041838)]$	$1.101672 - [(\ln \text{hardness})(0.041838)]$	0.994	0.994
<i>Chromium III</i>	0.316	0.860	--	--
<i>Chromium VI</i>	0.982	0.962	0.993	0.993
<i>Copper</i>	0.960	0.960	0.83	0.83
<i>Lead</i>	$1.46203 - [(\ln \text{hardness})(0.145712)]$	$1.46203 - [(\ln \text{hardness})(0.145712)]$	0.951	0.951
<i>Nickel</i>	0.998	0.997	0.990	0.990
<i>Selenium</i>	0.996	0.922	0.998	0.998
<i>Silver</i>	0.85	0.85	0.85	--
<i>Zinc</i>	0.978	0.986	0.946	0.946

EPA Action

Footnotes E and F are not applicable to any criteria in Table 33A because there is no citation to these footnotes anywhere in Table 33A. Additionally, Footnotes E and F to Table 33B set forth the same criteria for metals that are described above, and citations to Footnotes E and F are contained in Table 33B. Therefore, EPA's decision regarding Footnotes E and F and the associated criteria is set forth below in Part IV.B.5 (EPA's Action on the New Footnotes in Table 33B), Footnotes E and F.

EPA recommends the State delete these footnotes from Table 33A since there are no citations to them in Table 33A.

Footnote I

I This value is based on criterion published in Ambient Water Quality Criteria for Endosulfan (EPA 440/5-80-046) and should be applied as the sum of alpha and beta-endosulfan.

EPA Action

In accordance with its Clean Water Act authority, 33 U.S.C § 1313(c)(3) and 40 CFR § 131, EPA is disapproving Footnote I. This footnote provides clarification regarding the basis for Oregon's derivation of the endosulfan criteria. Footnote I also provides that the aquatic life criteria for endosulfan should be applied as the sum of alpha- and beta-endosulfan. This footnote directly affects how the endosulfan criteria are applied with respect to the forms of endosulfan, therefore, EPA considers this footnote to be a WQS requiring action under CWA 303(c).

EPA disapproves the addition of Footnote I to Table 33A because EPA disapproved moving the currently applicable endosulfan criteria from Table 20 to Table 33A because it would result in a duration and frequency that is inconsistent with EPA's 304(a) recommendations (see Part III.B.3), therefore this footnote does not cite to any criteria in Table 33A.

Since this footnote is reasonable when applied to the correct criteria, no change in the substance of the footnote would be necessary to address the disapproval as long as Oregon revises the underlying criteria to which it applied, in a manner approvable by EPA.

Footnote M

M Freshwater aquatic life values for pentachlorophenol are expressed as a function of pH, and are calculated as follows: $CMC = \exp(1.005(pH)-4.869)$; $CCC = \exp(1.005(pH)-5.134)$.

EPA Action

Footnote M provides the pH-based formulas used to derive the acute criterion (CMC) and the chronic criterion (CCC) for pentachlorophenol. The acute criterion for pentachlorophenol is contained in Table 33A, and EPA's approval of the acute criterion is presented in Part III.B.2 above.

The chronic criterion (CCC) for pentachlorophenol is not contained in Table 33A; rather, it is contained in Table 33B. EPA's approval of the chronic criterion is presented in Part IV.B.3(b) below.

EPA recommends that Oregon remove the chronic criterion (CCC) value from the Footnote M for Table 33A because the CCC for pentachlorophenol is contained in Table 33B.

Footnote N

N This number was assigned to the list of non-priority pollutants in "National Recommended Water Quality Criteria: 2002" (EPA-822-R-02-047).

EPA Action

EPA approves this footnote as a non-substantive editorial change. In 2002, EPA published a compilation of national recommended 304(a) recommendations (*National Recommended Water Quality Criteria: 2002*). One of the tables in EPA's compilation contained a numbered list of non-priority pollutants. Oregon has simply copied the numbers associated with each non-priority pollutant from EPA's 2002 list into their water quality standards. EPA acknowledges this minor editorial change and approves the non-substantive editorial change.

Footnote O

O This criterion is based on EPA recommendations issued in 1980 that were derived using guidelines that differed from EPA's 1985 Guidelines for minimum data requirements and derivation procedures. For example, a "CMC" derived using the 1980 Guidelines was derived to be used as an instantaneous maximum. If assessment is to be done using an averaging period, the values given should be divided by 2 to obtain a value that is more comparable to a CMC derived using the 1985 Guidelines.

EPA Action

In accordance with its Clean Water Act authority, 33 U.S.C § 1313(c)(3) and 40 CFR § 131, EPA is disapproving the addition of Footnote O.

EPA Rationale

Oregon's new Footnote O explains the origin of the criteria, and explains how the acute criterion should be implemented if a one-hour averaging period is used. EPA is disapproving Footnote O because it applies to aquatic life criteria that have been either disapproved due to inconsistency with 40 CFR 131.11(a) (see Part III.B.4) or the transfer of the criteria from Table 20 to Table 33A has been disapproved (see Part III.B.3). Therefore, this footnote is not applicable to any of the criteria in Table 33A.

Since this footnote is reasonable when applied to the correct criteria, no change in the substance of the footnote would be necessary to address the disapproval as long as Oregon revises the underlying criteria to which it applied, in a manner approvable by EPA.

Footnote P

P Criterion shown is the minimum (i.e. CCC in water should not be below this value in order to protect aquatic life).

EPA Action

In accordance with its Clean Water Act authority, 33 U.S.C § 1313(c)(3) and 40 CFR § 131, EPA is approving the addition of Footnote P as applied to alkalinity only.

EPA Rationale

Oregon applied this footnote to freshwater and saltwater acute and chronic criterion for endosulfan and to the chronic criterion for alkalinity.

Endosulfan

This footnote is incorrect as applied to endosulfan, as confirmed in a letter to EPA dated October 3, 2012 (letter from Greg Aldrich, ODEQ, to Daniel D. Opalski, EPA). Since EPA is disapproving the transfer of the endosulfan criteria from Table 20 to Table 33A, as described in Part III.B.3 above, the erroneous reference to this footnote in connection with the endosulfan criteria is also disapproved.

Alkalinity

As applied to the alkalinity criteria the footnote is consistent with EPA's 304(a) recommendations, therefore, EPA is approving this footnote for alkalinity and the reference to footnote P contained in Table 33A for alkalinity.

Footnote Q

Q Criterion is applied as total arsenic (i.e. arsenic (III) + arsenic (V)).

EPA Action

This footnote is not applicable to any criteria in Table 33A because there is no citation to this footnote anywhere in Table 33A. Because this footnote does not apply to any criteria in Table 33A,

it does not establish a legally binding requirement under State law nor does it describe a desired ambient condition of a water body to support a particular designated use. Therefore, the footnote is not considered a water quality standard subject to EPA review and approval under 303(c) of the CWA, and EPA is taking no action to approve or disapprove the new footnote.

EPA recommends the State delete this footnote from Table 33A since there is no citation to the footnote in Table 33A.

Footnote S

S This criterion is expressed as µg free cyanide (CN)/L.

EPA Action

In accordance with its Clean Water Act authority, 33 U.S.C § 1313(c)(3) and 40 CFR § 131, EPA is approving the addition of Footnote S.

EPA Rationale

Oregon has not changed the numeric criteria for cyanide (which were previously approved by EPA); rather, the footnote clarifies the form of cyanide that should be measured. It is consistent with EPA's 304(a) recommendations for calculating the criterion, which states criteria are expressed as free cyanide (see *Water Quality Criteria Documents for the Protection of Aquatic Life in Ambient Water*, September 1996, EPA-820-8-96-001, pages F1-F3).

This footnote establishes a legally binding requirement under State law and helps describe a desired ambient condition of a water body 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.

Footnote T

T This criterion applies to DDT and its metabolites (i.e. the total concentration of DDT and its metabolites should not exceed this value).

EPA Action

In accordance with its Clean Water Act authority, 33 U.S.C § 1313(c)(3) and 40 CFR § 131, EPA is disapproving the addition of Footnote T.

Oregon's new Footnote T for DDT explains that the criterion applies to DDT and its metabolites. It directly affects how the DDT criteria are applied with respect to the forms of DDT, therefore, EPA considers this footnote to be a WQS requiring action under CWA 303(c).

EPA disapproves the addition of Footnote T to Table 33A because EPA disapproved transferring the currently applicable DDT criteria from Table 20 to Table 33A. Therefore, this footnote does not apply to criteria in Table 33A.

Since this footnote is reasonable when applied to the correct criteria, no change in the substance of the footnote would be necessary to address the disapproval as long as Oregon revises the underlying criteria to which it applied, in a manner approvable by EPA.

Footnote U

U This criterion applies to total PCBs (e.g. the sum of all congener or all isomer or homolog or Arochlor analyses).

EPA Action

In accordance with its Clean Water Act authority, 33 U.S.C § 1313(c)(3) and 40 CFR § 131, EPA is approving the addition of Footnote S.

Oregon's new Footnote U for PCBs explains that the criterion applies to total PCBs. EPA has reviewed this footnote language and the 304(a) criteria recommendations, which state that the "criterion applies to total PCBs, (e.g., the sum of all congener or all isomer or homolog or Arochlor analyses.)" Oregon's new footnote language along with the aquatic life criterion values (which were previously approved) for PCBs are consistent with EPA's recommended 304(a) national default values.

This footnote establishes a legally binding requirement under State law and helps describe a desired ambient condition of a water body 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 currently EPA approved criterion. Since this footnote specifies the applicable form of the PCB criterion Oregon adopted, EPA approves this footnote as a WQS.

Footnote V

V The $CMC = 1 / [(f1/CMC1) + (f2/CMC2)]$ where $f1$ and $f2$ are the fractions of total selenium that are treated as selenite and selenate, respectively, and $CMC1$ and $CMC2$ are 185.9 µg/L and 12.82 µg/L, respectively.

EPA Action

This footnote is not applicable to any criteria in Table 33A because there is no citation to this footnote anywhere in Table 33A. Additionally, Footnote V to Table 33B sets forth the same criterion for acute selenium that is described above, and Footnote V is cited in Table 33B. Therefore, EPA's decision regarding this criterion is set forth below in Part IV.B.4.e (Freshwater Acute and Chronic Selenium Aquatic Life Criteria).

EPA recommends the State delete this footnote from Table 33A since there is no citations to the footnote in Table 33A.

Footnote W

W The acute and chronic criteria for aluminum are 750 µg/L and 87 µg/L, respectively. These values for aluminum are expressed in terms of "total recoverable" concentration of metal in the water column. The criterion applies at $pH < 6.6$ and hardness < 12 mg/L (as $CaCO_3$).

EPA Action

This footnote is not applicable to any criteria in Table 33A because there is no citation to this footnote anywhere in Table 33A. Additionally, Footnote W to Table 33B sets forth the same criteria for aluminum that is described above, and Footnote W is cited in Table 33B. Therefore, EPA's decision regarding this criterion is set forth below in Part IV.B.4.a (Freshwater Acute and Chronic Aluminum Aquatic Life Criteria).

EPA recommends the State delete the footnote from Table 33A since there is no citation to the footnote in Table 33A.

Footnote X

X The effective date for the criterion in the column immediately to the left is 1991.

EPA Action

EPA is approving this footnote as a non substantive change that does not change the criteria or the effective date of the criteria. The footnote simply acknowledges the criteria that became effective in 1991.

Footnote Y

Y No criterion.

EPA Action

This footnote is not applicable to any criteria in Table 33A because there is no citation to this footnote anywhere in Table 33A. Because this footnote does not apply to any criteria in Table 33A, it does not establish a legally binding requirement under State law nor does it describe a desired ambient condition of a water body to support a particular designated use. Therefore the footnote is not considered a water quality standard subject to EPA review and approval under 303(c) of the CWA, and EPA is taking no action to approve or disapprove the new footnote.

EPA recommends the State delete the footnote from Table 33A since there is no citation to the footnote in Table 33A.

6. EPA's Action on Non-substantive Formatting Changes in Table 33A

Oregon's revisions to its water quality standards resulted in formatting changes to its water quality criteria table. The following numeric criteria in Table 33A were previously contained in Table 20, and previously approved by EPA. Oregon has not revised the criteria, they have simply moved the criteria to a new Table.

Alkalinity (freshwater chronic)

Chloride (freshwater acute and chronic)

Chlorine (freshwater and saltwater acute and chronic)

Chlorpyrifos (freshwater and saltwater acute and chronic)

Cyanide (freshwater and saltwater acute and chronic)

Demeton (freshwater acute, saltwater acute)

Guthion (freshwater chronic, saltwater chronic)

Iron (freshwater chronic)

Malathion (freshwater chronic, saltwater chronic)

Methoxychlor (freshwater chronic, saltwater chronic)

Mirex (freshwater chronic, marine chronic)

Parathion (freshwater acute and chronic)

Polychlorinated Biphenyls (freshwater and saltwater acute and chronic)

Pentachlorophenol (saltwater acute and chronic)
Phosphorus-elemental (saltwater chronic)
Sulfide-Hydrogen Sulfide (freshwater and saltwater chronic)
Toxaphene (freshwater and saltwater acute and chronic)

Additionally, when Oregon adopted human health criteria in 2011, Oregon created a new Table 40 that contains all the human health criteria. Therefore, Oregon omitted from Table 33A not only the human health criteria themselves, but also all references to human health criteria in the introductory paragraph. Oregon also removed Footnotes B, G, H, J, K, L, and R (which all referred to the human health criteria) at that time.

EPA Action

EPA acknowledges that the above referenced criteria, which were previously approved by EPA under 303(c) of the CWA, were moved from Table 20 to Table 33A; and acknowledges the editorial changes made to the introductory language and the removal of the footnotes associated with human health criteria. EPA approves these changes as non-substantive formatting changes.

IV. EPA'S ACTION ON THE INTRODUCTORY LANGUAGE, NEW AND REVISED AQUATIC LIFE CRITERIA, AND FOOTNOTES IN TABLE 33B

A. Table 33B in Oregon's Water Quality Standards

The following presents the introductory language to Table 33B, new/revised criteria contained in Table 33B, and new footnotes to Table 33B. All new language from the 2004 and 2011 revisions, including new and revised criteria, is underlined; strikeout text indicates the language that was removed during Oregon's 2007 water quality standards adoption (i.e., freshwater and saltwater acute and chronic arsenic criteria, and the saltwater acute and chronic chromium VI criteria) or during the 2011 water quality standards adoption (i.e., all other strikeout language).

Table 33B

Note: The Environmental Quality Commission adopted the following criteria on May 20, 2004 to become effective on EPA approval. EPA has not yet (as of June 2006) approved the criteria. The Table 33B criteria may not be used until they are approved by EPA⁷.

AQUATIC LIFE WATER QUALITY CRITERIA SUMMARY^A

The concentration for each compound listed in Table 33A is a criterion not to be exceeded in waters of the state in order to protect aquatic life and human health. All values are expressed as micrograms per liter (µ/L) except where noted. Compounds are listed in alphabetical order with the corresponding EPA number (from National Recommended Water Quality Criteria:2002, EPA 8220R-02-047), the Chemical Abstract Service (CAS) number, aquatic life freshwater acute and chronic criteria, aquatic life saltwater acute and chronic criteria, and human health water & organism and organism only criteria, and Drinking Water Maximum Contaminant Level (MCL). The acute criteria refer to the average concentration for one (1) hour and the chronic criteria refer to the average concentration for 96 hours (4-days), and that these criteria should not be exceeded more than once every three (3) years.

EPA No.	Compound	CAS Number	Freshwater				Saltwater			
			Acute (CMC)	Effective Date	Chronic (CCC)	Effective Date	Acute (CMC)	Effective Date	Chronic (CCC)	Effective Date
2 N	Aluminum (pH 6.5 - 9.0)	7429905	W		W					
3 N	Ammonia	7664417	C		C					
2	Arsenic	7440382	340 E,Q		150 E, Q			69 E, Q		36 E, Q
15	Asbestos	1332214								
19	Benzene	71432								
3	Beryllium	7440417								
105	BHC gamma- (Lindane)	58899								
4	Cadmium	7440439	E,F		E,F			40 E		8.8 E
107	Chlordane	57749								
	<u>CHLORINATED BENZENES</u>									
26	Chloroform	67663								
67	ChloroisopropylEther Bis2-	108601								
15 N	ChloromethylEther, Bis	542881								
5a	Chromium (III)		E,F		E,F					
5b	Chromium (VI)	18540299	16 E		11 E			1100 E		50 E
6	Copper	7440508	E,F		E,F			4.8 E		3.1 E
108	DDT 4,4'-	50293								
	<u>DIBUTYLPHTHALATE</u>									

⁷ EPA approved this note to Table 33B in its February 18, 2011 action.

EPA No.	Compound	CAS Number	Freshwater				Saltwater			
			Acute (CMC)	Effective	Chronic (CCC)	Effective	Acute (CMC)	Effective Date	Chronic (CCC)	Effective Date
	<u>DICHLOROBENZENES</u>									
	<u>DICHLOROBENZIDINE</u>									
	<u>DICHLOROETHYLENES</u>									
	<u>DICHLOROPROPENE</u>									
111	Dieldrin	60571			0.056					
	<u>DINITROTOLUENE</u>									
	<u>DIPHENYLHYDRAZINE</u>									
115	Endrin	72208			0.036					
86	Fluoranthene	206440								
	<u>HALOMETHANES</u>									
20 N	Iron	7439896								
7	Lead	7439921	E,F		E,F	210 E		8.1 E		
22 N	Manganese	7439965								
8a	Mercury	7439976								
	<u>MONOCHLOROBENZENE</u>									
9	Nickel	7440020	E,F		E,F	74 E		8.2 E		
53	Pentachlorophenol	87865			M					
54	Phenol	108952								
	<u>POLYNUCLEAR AROMATIC HYDROCARBONS</u>									
10	Selenium	7782492	E,V		5 E	290 E		71 E		
11	Silver	7440224	E,F,P		0.10 E	1.9 E,P				
44 N	Tributyltin (TBT)	688733	0.46		0.063	0.37		0.01		
41	Trichloroethane 1,1,1-	71556								
55	Trichlorophenol 2,4,6-	88062								
13	Zinc	7440666	E,F		E,F	90 E		81 E		

Footnotes for Table 33A and 33B

A Values in Table 20 are applicable to all basins.

B ~~Human Health criteria values were calculated using a fish consumption rate of 17.5 grams per day (0.6 ounces/day) unless otherwise noted. (was deleted in 2011)~~

C Ammonia criteria for freshwater may depend on pH, temperature, and the presence of salmonids or other fish with ammonia-sensitive early life stages. Values for freshwater criteria (of total ammonia nitrogen in mg N/L) can be calculated using the formulae specified in *1999 Update of Ambient Water Quality Criteria for Ammonia* (EPA-822-R-99-014; <http://www.epa.gov/ost/standards/ammonia/99update.pdf>):

Freshwater Acute:

$$\text{salmonids present...CMC} = \frac{0.275}{1 + 10^{7.204 - \text{pH}}} + \frac{39.0}{1 + 10^{\text{pH} - 7.204}}$$

$$\text{salmonids not present...CMC} = \frac{0.411}{1 + 10^{7.204 - \text{pH}}} + \frac{58.4}{1 + 10^{\text{pH} - 7.204}}$$

Freshwater Chronic:

fish early life stages present:

$$\text{CCC} = \frac{0.0577}{1 + 10^{7.688 - \text{pH}}} + \frac{2.487}{1 + 10^{\text{pH} - 7.688}} * \text{MIN}(2.85, 1.45 * 10^{0.028 * (25 - T)})$$

fish early life stages not present:

$$\text{CCC} = \frac{0.577}{1 + 10^{7.688 - \text{pH}}} + \frac{2.487}{1 + 10^{\text{pH} - 7.688}} * 1.45 * 10^{0.028 * (25 - \text{MAX}(T, 7))}$$

Note: these chronic criteria formulae would be applied to calculate the 30-day average concentration limit; in addition, the highest 4-day average within the 30-day period should not exceed 2.5 times the CCC.

D Ammonia criteria for saltwater may depend on pH and temperature. Values for saltwater criteria (total ammonia) can be calculated from the tables specified in *Ambient Water Quality Criteria for Ammonia (Saltwater)--1989* (EPA 440/5-

88-004; <http://www.epa.gov/ost/pc/ambientwqc/ammoniasalt1989.pdf>.

- ~~E~~ Freshwater and saltwater criteria for metals are expressed in terms of “dissolved” concentrations in the water column, except where otherwise noted (e.g. aluminum).
- ~~F~~ The freshwater criterion for this metal is expressed as a function of hardness (mg/L) in the water column. Criteria values for hardness may be calculated from the following formulae (CMC refers to Acute Criteria; CCC refers to Chronic Criteria):

$$CMC = (\exp(m_A * [\ln(\text{hardness})] + b_A)) * CF$$

$$CCC = (\exp(m_C * [\ln(\text{hardness})] + b_C)) * CF$$

where CF is the conversion factor used for converting a metal criterion expressed as the total recoverable fraction in the water column to a criterion expressed as the dissolved fraction in the water column.

Chemical	m_A	b_A	m_C	b_C
Cadmium	1.0166	-3.924	0.7409	-4.719
Chromium III	0.8190	3.7256	0.8190	0.6848
Copper	0.9422	-1.700	0.8545	-1.702
Lead	1.273	-1.460	1.273	-4.705
Nickel	0.8460	2.255	0.8460	0.0584
Silver	1.72	-6.59		
Zinc	0.8473	0.884	0.8473	0.884

Conversion factors (CF) for dissolved metals (the values for total recoverable metals criteria were multiplied by the appropriate conversion factors shown below to calculate the dissolved metals criteria):

Chemical	Freshwater		Saltwater	
	Acute	Chronic	Acute	Chronic
Arsenic	1.000	1.000	1.000	1.000
Cadmium	1.136672-[ln hardness)(0.041838)]	1.101672-[ln hardness)(0.041838)]	0.994	0.994
Chromium III	0.316	0.860	--	--
Chromium VI	0.982	0.962	0.993	0.993
Copper	0.960	0.960	0.83	0.83
Lead	1.46203-[ln hardness)(0.145712)]	1.46203-[ln hardness)(0.145712)]	0.951	0.951
Nickel	0.998	0.997	0.990	0.990
Selenium	0.996	0.922	0.998	0.998
Silver	0.85	0.85	0.85	--
Zinc	0.978	0.986	0.946	0.946

- ~~G~~ Human Health criterion is the same as originally published in the 1976 EPA Red Book (Quality Criteria for Water, EPA 440/9-76-023) which predates the 1980 methodology and did not use a fish ingestion BCF approach.
- ~~H~~ This value is based on a Drinking Water regulation.
- ~~I~~ This value is based on criterion published in Ambient Water Quality Criteria for Endosulfan (EPA 440/5-80-046) and should be applied as the sum of alpha and beta endosulfan.
- ~~J~~ No BCF was available; therefore, this value is based on that published in the 1986 EPA Gold Book.
- ~~K~~ Human Health criterion is for “dissolved concentration based on the 1976 EPA Red Book conclusion that adverse effects from exposure at this level are aesthetic rather than toxic.
- ~~L~~ This value is expressed as the fish tissue concentration of methylmercury.
- ~~M~~ Freshwater aquatic life values for pentachlorophenol are expressed as a function of pH, and are calculated as follows: CMC=(exp(1.005(pH)-4.869)); CCC=exp(1.005(pH)-5.134).
- ~~N~~ This number was assigned to the list of non-priority pollutants in National Recommended Water Quality Criteria: 2002 (EPA-822-R-02-047).
- ~~O~~ This criterion is based on EPA recommendations issued in 1980 that were derived using guidelines that differed from EPA's 1985 Guidelines for minimum data requirements and derivation procedures. For example, a "CMC" derived using the 1980 Guidelines was derived to be used as an instantaneous maximum. If assessment is to be done using an

averaging period, the values given should be divided by 2 to obtain a value that is more comparable to a CMC derived using the 1985 Guidelines.

P Criterion shown is the minimum (i.e. CCC in water should not be below this value in order to protect aquatic life).

Q Criterion is applied as total arsenic (i.e. arsenic (III) + arsenic (V)).

R Arsenic criterion refers to the inorganic form only.

S This criterion is expressed as µg free cyanide (CN)/L.

T This criterion applies to DDT and its metabolites (i.e. the total concentration of DDT and its metabolites should not exceed this value).

U This criterion applies to total PCBs (e.g. the sum of all congener or all isomer or homolog or Arochlor analyses).

V The $CMC = 1 / [(f1/CMC1) + (f2/CMC2)]$ where f1 and f2 are the fractions of total selenium that are treated as selenite and selenate, respectively, and CMC1 and CMC2 are 185.9 µg/L and 12.82 µg/L, respectively.

W The acute and chronic criteria for aluminum are 750 µg/L and 87 µg/L, respectively. These values for aluminum are expressed in terms of “total recoverable” concentration of metal in the water column. The criterion applies at pH<6.6 and hardness<12 mg/L (as CaCO₃).

X The effective date for the criterion in the column immediately to the left is 1991.

Y No criterion.

B. EPA’s CWA Determinations on Table 33B

1. EPA’s Action on the Introductory Language to Table 33B

This section of the document addresses the introductory language to Table 33B. The introductory language states:

The concentration for each compound listed in Table 33A is a criterion not to be exceeded in waters of the state in order to protect aquatic life and human health. All values are expressed as micrograms per liter (µg/L) except where noted. Compounds are listed in alphabetical order with the corresponding EPA number (from National Recommended Water Quality Criteria:2002, EPA 8220R-02-047), the Chemical Abstract Service (CAS) number, aquatic life freshwater acute and chronic criteria, aquatic life saltwater acute and chronic criteria, ~~human health water & organisms and organisms only,~~ and ~~Drinking Water Maximum Contaminant Level (MCL)~~. The acute criteria refer to the average concentration for one (1) hour and the chronic criteria refer to the average concentration for 96 hours (4-days), and that these criteria should not be exceeded more than once every three (3) years.

EPA Action

In accordance with its Clean Water Act authority, 33 U.S.C § 1313(c)(3) and 40 CFR § 131, EPA approves the introductory language for Table 33B.

EPA Rationale

The introductory language to the table provides the frequency and duration for each aquatic life criterion (i.e., acute criterion is expressed as the one-hour average not to be exceeded more than once every three years, and the chronic criterion is expressed as the four-day average not to be exceeded more than once every three years), requires waters of the State not to exceed the criterion, describes the units used for each chemical, and describes the organization of the table. Additionally, references to human health criteria were deleted from the introductory language because in Oregon’s 2011 adoption, Table 40 was created and contains all of the human health criteria.

The federal regulation at 40 CFR 131.11(b) states that in establishing criteria, States should set numerical values based on EPA's 304(a) recommendation (potentially modified to reflect site-specific conditions) or other scientifically defensible methods. EPA's 304(a) recommendation generally consist of a magnitude (level of pollutant that is allowable, usually expressed as a concentration), duration (the period of time [averaging period] over which the instream concentration is averaged for comparison with criteria concentrations), and frequency (how often a particular criterion can be exceeded). The introductory language specifies a reasonable duration and frequency to be used for the magnitudes listed in the table that follows; therefore, EPA is approving this language. EPA's specific determinations on the adequacy of the magnitude for each new or revised criterion to protect Oregon's fish and aquatic life designated use, given the specified duration and frequency, is provided below.

EPA approves the language stating "The concentration for each compound listed in Table 33A is a criterion not to be exceeded in water of the state in order to protect aquatic life." This language describes the intent of the criteria to protect aquatic life uses in Oregon in waters of the state. As stated above, EPA's action on each individual criterion in the Table are provided below.

An examination of Oregon's submission reveals that the reference to Table 33A in the introductory language to Table 33B is a non-substantive typographical error. EPA notes that there is sufficient intrinsic evidence within the submission to establish that the language is an error (i.e., the language is located within Table 33B and Table 33A already contains identical introductory language). Finally, Oregon has confirmed that the reference to Table 33A in Table 33B is a mere typographical error (see October 3, 2112 letter from Greg Aldrich, ODEQ to Daniel Opalski, EPA).

Additionally, EPA acknowledges the editorial changes made by removing references to human health criteria in the introductory language. EPA approves this change as a non-substantive editorial change.

2. Aquatic Life Criteria Deleted from Table 33B (Freshwater and Saltwater Arsenic Criteria, Saltwater Chromium VI Criteria)

This section of the document addresses the freshwater and saltwater acute and chronic aquatic life criteria for arsenic, and the saltwater acute and chronic criteria for chromium VI. EPA is including this narrative in the record to document the events that occurred since 2004.

Oregon's July 2004 water quality standards submittal package to the EPA contained revised aquatic life criteria for arsenic and chromium VI in Table 33B that superceded existing, less stringent criteria located in Table 20 (which EPA had approved in 1999). On February 22, 2007, the EQC adopted a number of rule revisions to correct errors and clarify language in Oregon's water quality standards; Oregon submitted them to the EPA for review and approval on April 23, 2007. However, the 2007 revision of Table 33B inadvertently omitted the revised freshwater and saltwater acute and chronic criteria for arsenic, and the revised saltwater acute and chronic criteria for chromium VI. Because the 2007 revision to Table 33B failed to carry forward the 2004 addition of these criteria to Table 33B, it had the effect of eliminating the 2004 revision to these criteria prior to EPA taking any CWA § 303(c) action on the revision. In an attempt to implement ESA § 7(a)(2) with respect to the July 2004 submission, EPA subsequently consulted with the National Marine Fisheries Service and the U.S. Fish and Wildlife Service ("Services") on the July 2004 revised criteria noted above. At the time that EPA

initiated this consultation, EPA was unaware that the 2004 revised aquatic life criteria for arsenic and chromium VI were no longer in existence under Oregon state law. In 2012, EPA became aware that these criteria were no longer in existence, and thus could be neither approved nor disapproved.

The following presents the revised aquatic life criteria that Oregon added to Table 33B in July 2004 and that Oregon subsequently deleted from Table 33B on February 22, 2007:

Arsenic, total (arsenic III + arsenic V), expressed as dissolved concentration

freshwater acute :	340 µg/L
freshwater chronic :	150 µg/L
saltwater acute :	69 µg/L
saltwater chronic :	36 µg/L

Chromium VI, expressed as dissolved concentration

saltwater acute :	1100 µg/L
saltwater chronic :	50 µg/L

In 2004, Oregon also adopted conversion factors for the above criteria in Footnote F of Table 33B. Conversion factors are used for converting a metal criterion expressed as a total recoverable fraction in the water column to a criterion expressed as the dissolved fraction in the water column. The conversion factors are still contained in Footnote F of Table 33B.

EPA Action

EPA is not taking action on the freshwater and saltwater acute and chronic arsenic criteria and the saltwater acute and chronic chromium VI criteria adopted into Oregon's water quality standards (Table 33B) in 2004 and subsequently removed from Oregon's water quality standards in 2007. Oregon's 2007 rule revision removed the 2004 criteria from State law, and Oregon's 2007 submission to EPA superseded its 2004 submission to EPA. Therefore, the omitted criteria are no longer pending before EPA for review.

Additionally, EPA is not taking action on the conversion factors for freshwater and saltwater acute and chronic arsenic criteria or the conversion factors for saltwater acute and chronic chromium VI criteria adopted in Oregon's water quality standards in Footnote F of Table 33B because the criteria that these conversion factors applied to are no longer contained in Table 33B; therefore, they have no effect.

Oregon's pre-2004 criteria for arsenic and chromium VI criteria remain in Table 20, and remain in effect for CWA purposes. These criteria are:

Arsenic (III), expressed as total recoverable concentration

freshwater acute –	360 µg/L
freshwater chronic –	190 µg/L
saltwater acute –	69 µg/L
saltwater chronic –	36 µg/L

Chromium VI, expressed as total recoverable concentration

saltwater acute –	1100 µg/L
saltwater chronic –	50 µg/L

EPA notes that the arsenic and chromium VI criteria that Oregon adopted in 2004 and withdrew in 2007 are consistent with EPA's 304(a) recommendations. In addition, according to the National Marine Fisheries Service and the U.S. Fish and Wildlife Service, EPA's approval of these criteria will not cause jeopardy to any ESA-listed species and therefore, EPA recommends that Oregon re-adopt these inadvertently omitted criteria. (See also Part IV.B.6, where EPA also recommends that Oregon adopt Footnote Q, which is associated with the aquatic life arsenic criteria but was inadvertently deleted from the footnote section of Table 33B).

3. Approval Action for New or Revised Aquatic Life Criteria in Table 33B

This section of the document contains EPA's specific determinations on the adequacy of the magnitude for each new and revised criterion, identified below, to protect Oregon's fish and aquatic life designated use, given the duration and frequency specified in the introductory language to Table 33B. Specifically, the acute criteria are expressed as one-hour averages that should not be exceeded more than once in three years, and the chronic criteria are expressed as four-day averages that should not be exceeded more than once in three years (see Part IV.B.1., above for EPA's approval action for duration and frequency).

a) Approval Action for New or Revised Aquatic Life Metals Criteria

The hardness-based equations for each of the following freshwater aquatic life criteria are found in Footnote F of Table 33B:

Cadmium:	chronic only
Chromium III:	acute and chronic
Lead:	acute and chronic
Nickel:	acute and chronic
Silver:	acute only
Zinc:	acute and chronic

The following freshwater numeric criteria are contained in Table 33B:

Chromium VI:	acute and chronic
Silver:	chronic

Additionally, each of the above listed freshwater criteria (i.e., cadmium, chromium III, lead, nickel silver, zinc, chromium VI, and silver) reference Footnote E of Table 33B which states that the criteria are expressed in terms of dissolved concentrations in the water column.

The following saltwater numeric criteria are contained in Table 33B:

Cadmium:	acute and chronic
Copper:	acute and chronic
Lead:	acute and chronic
Nickel:	acute and chronic
Silver:	acute
Selenium:	acute and chronic
Zinc:	acute and chronic

Additionally, each of the above listed saltwater criteria reference Footnote E of Table 33B, which states that the criteria are expressed in terms of dissolved concentrations in the water column.

Oregon adopted conversion factors (CF) for all of the criteria listed in table the below. The CFs are found in Footnote F of Table 33B. A conversion factor (CF) is used for converting a metal criterion expressed as the total recoverable fraction in the water column to a criterion expressed as the dissolved fraction in the water column.

The following table provides a summary of the freshwater hardness-based equations (found in Footnote F of Table 33B), the freshwater and saltwater numeric criteria (contained within Table 33B), and the conversion factors associated with each chemical (found in Footnote F):

Chemical	Freshwater/Saltwater Acute/Chronic	Magnitude, dissolved	Conversion Factor (CF)
Cadmium	freshwater chronic	$(\exp(0.7409 * [\ln(\text{hardness})] - 4.719)) * \text{CF}$	$1.101672 - [(\ln \text{hardness})(0.041838)]$
	saltwater acute	40 µg/L	0.994
	saltwater chronic	8.8 µg/L	0.994
Chromium III	freshwater acute	$(\exp(0.8190 * [\ln(\text{hardness})] + 3.7256)) * \text{CF}$	0.316
	freshwater chronic	$(\exp(0.8190 * [\ln(\text{hardness})] + 0.6848)) * \text{CF}$	0.860
Chromium VI	freshwater acute	16 µg/L	0.983
	freshwater chronic	11 µg/L	0.962
Copper	saltwater acute	4.8 µg/L	0.83
	saltwater chronic	3.1 µg/L	0.83
Lead	freshwater acute	$(\exp(1.273 * [\ln(\text{hardness})] - 1.460)) * \text{CF}$	$1.46203 - [(\ln \text{hardness})(0.145712)]$
	freshwater chronic	$(\exp(1.273 * [\ln(\text{hardness})] - 4.705)) * \text{CF}$	$1.46203 - [(\ln \text{hardness})(0.145712)]$
	saltwater acute	210 µg/L	0.951
	saltwater chronic	8.1 µg/L	0.951
Nickel	freshwater acute	$\exp(0.8460 * [\ln(\text{hardness})] + 2.255)) * \text{CF}$	0.998
	freshwater chronic	$(\exp(0.8460 * [\ln(\text{hardness})] + 0.0584)) * \text{CF}$	0.997
	saltwater acute	74 µg/L	0.990
	saltwater chronic	8.2 µg/L	0.990
Silver	freshwater acute	$(\exp(1.72 * [\ln(\text{hardness})] - 6.59)) * \text{CF}$	0.85
	freshwater chronic	0.01 µg/L	0.85
	saltwater acute	1.9 µg/L	0.85
Selenium	saltwater acute	290 µg/L	0.998
	saltwater chronic	71 µg/L	0.998
Zinc	freshwater acute	$(\exp(0.8473 * [\ln(\text{hardness})] + 0.884)) * \text{CF}$	0.978
	freshwater chronic	$(\exp(0.8473 * [\ln(\text{hardness})] + 0.884)) * \text{CF}$	0.986
	saltwater acute	90 µg/L	0.946
	saltwater chronic	81 µg/L	0.946

EPA Action

In accordance with its Clean Water Act authority, 33 U.S.C § 1313(c)(3) and 40 CFR § 131, EPA approves the magnitude and conversion factors for each of the criteria described above and the reference to Footnote E, which expresses the criteria as the dissolved concentration in the water column.

EPA Rationale

EPA conducted an evaluation, in accordance with the methodology described in Section 1.0 of the STSD (see Enclosure 2), of each of the criteria referenced above to determine whether the criteria protect Oregon's fish and aquatic life designated use. Section 2.0 of the STSD presents all of the relevant toxicological data that the EPA reviewed as well as an analysis and summary of the data for each of the chemicals listed above. All of the relevant data show that the criteria for the above referenced chemicals are protective of Oregon's fish and aquatic life use, therefore, EPA approves these aquatic life criteria.

For the technical evaluation of a specific criterion, refer to Section 2.0 of the STSD (contained in Enclosure 2).

b) Approval Action for Dieldrin, Endrin, Pentachlorophenol, and Tributyltin Aquatic Life Criteria

The following freshwater and saltwater criteria are contained in Table 33B:

Dieldrin:	(freshwater chronic)	0.056 µg/L
Endrin:	(freshwater chronic)	0.036 µg/L
Tributyltin:	(freshwater acute)	0.46 µg/L
	(freshwater chronic)	0.063 µg/L
	(saltwater acute)	0.37 µg/L
	(saltwater chronic)	0.01 µg/L

The freshwater chronic criterion for pentachlorophenol is a pH-dependent equation and is found in Footnote M of Table 33B. The chronic criterion is:

Pentachlorophenol: (freshwater chronic) $CCC = \exp(1.005(\text{pH}) - 5.134)$

EPA Action

In accordance with its Clean Water Act authority, 33 U.S.C § 1313(c)(3) and 40 CFR § 131, EPA approves the magnitude (including the formula for Pentachlorophenol found in Footnote M), frequency, and duration of the above referenced criteria.

Rationale

EPA conducted an evaluation, in accordance with the methodology described in Section 1 of the STSD (see Enclosure 2), of each of the criteria referenced above to determine whether the criteria protect Oregon's fish and aquatic life designated use. Section 2 of the STSD presents all of the relevant toxicological data that the EPA reviewed as well as an analysis and summary of the data for each of the chemicals listed above. All of the relevant data show that the criteria for the above referenced chemicals are protective of Oregon's fish and aquatic life use, therefore EPA approves these aquatic life criteria.

For the technical evaluation for a specific criterion refer to Section 2.0 of the STSD (contained in Enclosure 2).

4. Disapproval Action for New or Revised Aquatic Life Criteria in Table 33B

This section of the document addresses new or revised aquatic life criteria adopted by Oregon and EPA's disapproval decisions.

a) *Freshwater Acute and Chronic Aluminum Aquatic Life Criteria*

Footnote W in Table 33B provides the magnitude for the freshwater acute and chronic aquatic life criteria for aluminum, and specifies when the criteria are applicable. Specifically, Footnote W states:

The acute and chronic criteria for aluminum are 750 µg/L and 87 µg/L, respectively. These values for aluminum are expressed in terms of "total recoverable" concentration of metal in the water column. The criterion applies at pH < 6.6 and hardness < 12 mg/L (as CaCO₃).

The applicable duration and frequency are described in the introductory language to Table 33B as a one-hour average that should not be exceeded more than once in three years for the acute criterion, and a four-day average that should not be exceeded more than once in three years for the chronic criterion (see Part IV.B.1 for EPA's approval action for duration and frequency).

EPA Action

In accordance with its Clean Water Act authority, 33 U.S.C § 1313(c)(3) and 40 CFR § 131, EPA disapproves the freshwater acute and chronic aquatic life aluminum criteria adopted in Footnote W.

EPA Rationale

While Oregon adopted criteria that are numerically consistent with the magnitudes identified in EPA's 304(a) recommendation (750 µg/L and 87 µg/L for acute and chronic criteria respectively), Oregon also adopted additional language in Footnote W specifying that the aluminum criteria apply to waters with pH values less than 6.6 and hardness values less than 12 mg/L (as CaCO₃). This is inconsistent with EPA's 304(a) recommendation, which provides that the same numeric concentrations apply specifically at pH values of 6.5 to 9.0 (see *Ambient Water Quality Criteria for Aluminum – 1988*, EPA 440/5-86-008, August 1988). Different pH and hardness values may affect the sensitivity of aquatic organisms to aluminum. Oregon did not provide a sound scientific rationale in its supporting documentation to demonstrate that 750 µg/L (acute) and 87 µg/L (chronic) are protective of designated aquatic life uses in Oregon at low pH (i.e., less than 6.6) and low hardness values (i.e., less than 12 mg/L CaCO₃). Therefore, the EPA is disapproving the freshwater acute and chronic aquatic life criteria, which are contained in Footnote W.

Remedies to Address EPA's Disapproval

There are several potential options Oregon could consider in establishing aluminum criteria that are based on scientifically defensible methods and protect Oregon's designated aquatic life uses, including:

- Replace the pH and hardness parameters of the aluminum criteria to match nationally recommended 304(a) numeric criteria. Supply a sound scientific rationale for Oregon’s view that EPA’s nationally recommended 304(a) numeric criteria for aluminum are protective of Oregon’s designated aquatic life uses, addressing the National Marine Fisheries Service’s (“NMFS”) concerns regarding the adoption of EPA’s recommended 304(a) numeric criteria for aluminum in Oregon (as expressed in NMFS’s August 14, 2012 Biological Opinion).
- Revise the aluminum criteria to protect Oregon’s designated aquatic life uses. In developing such criteria, address NMFS’s Oregon-specific analysis of EPA’s 304(a) recommended criteria for aluminum (in the NMFS August 14, 2012 Biological Opinion). Supply a sound scientific rationale to establish that Oregon’s revised numeric criteria for aluminum are protective of Oregon’s designated aquatic life uses, addressing NMFS’s concerns about EPA’s national recommended criteria to the extent such concerns are also relevant to the protectiveness analysis for Oregon’s revised criteria.

Unless Oregon informs EPA that it intends to bring the criteria into compliance as described above, EPA will prepare and publish proposed regulations setting forth revised or new water quality criteria for the protection of Oregon’s aquatic life designated uses from exposure to aluminum.

Freshwater Aquatic Life Criteria Currently in Effect in Oregon

Until EPA approves or promulgates revisions to numeric freshwater acute and chronic aquatic life criteria for aluminum, the narrative criterion (OAR 340-042-0033(2)) applicable to the designated aquatic life uses in Oregon is in effect for CWA purposes.

b) Freshwater Acute and Chronic Ammonia Aquatic Life Criteria

Oregon adopted the following freshwater acute and chronic aquatic life criteria for ammonia, in Footnote C of Table 33B. Footnote C states the following:

Ammonia criteria for freshwater may depend on pH, temperature, and the presence of salmonids or other fish with ammonia-sensitive early life stages. Values for freshwater criteria (of total ammonia nitrogen in mg N/L) can be calculated using the formulae specified in 1999 Update of Ambient Water Quality Criteria for Ammonia (EPA-822-R-99-014; <http://www.epa.gov/ost/standards/ammonia/99update.pdf>):

Freshwater Acute:

salmonids present: $CMC = \frac{0.275}{1 + 10^{7.204-pH}} + \frac{39.0}{1 + 10^{pH-7.204}}$

salmonids not present: $CMC = \frac{0.411}{1 + 10^{7.204-pH}} + \frac{58.4}{1 + 10^{pH-7.204}}$

Freshwater Chronic:

fish early life stages present:

$CCC = \frac{0.0577}{1 + 10^{7.688-pH}} + \frac{2.487}{1 + 10^{pH-7.688}} * MIN(2.85, 1.45 * 10^{0.028*(25-T)})$

fish early life stages not present:

$$CCC = \frac{0.577}{1 + 10^{7.688-pH}} + \frac{2.487}{1 + 10^{pH-7.688}} * 1.45 * 10^{0.028*(25-MAX(T,7))}$$

Note: these chronic criteria formulae would be applied to calculate the 30-day average concentration limit; in addition, the highest 4-day average within the 30-day period should not exceed 2.5 times the CCC.

EPA Action

In accordance with its Clean Water Act authority, 33 U.S.C § 1313(c)(3) and 40 CFR § 131, EPA disapproves the freshwater acute and chronic criteria for ammonia.

EPA Rationale

Oregon adopted the EPA's 1999 304(a) recommendations for freshwater acute and chronic aquatic life criteria for ammonia. The 1999 recommendations were the most recent 304(a) recommendation when Oregon revised their water quality criteria in 2004.

Since 1999, EPA has conducted several literature searches to locate results of laboratory toxicity tests that quantify the adverse effects of ammonia on freshwater aquatic life, with particular attention given to tests conducted with freshwater mussels because such data were not available for many of these species at the time EPA published the 1999 304(a) recommendation for ammonia.

In 2009, EPA proposed a draft update to its 304(a) recommended criteria for ammonia. The proposed acute and chronic criteria are more stringent than the 1999 304(a) recommended criteria due to the new toxicity data for freshwater molluscs that are very sensitive to ammonia.

In developing recommendations under section 304(a) of the CWA, EPA bases its criteria on approximately the 5th percentile genera for a given pollutant, which is often the four or five most sensitive genera.⁸ Based on the toxicity data, the most sensitive genera used to develop the proposed draft 2009 acute criterion are freshwater molluscs. This stands in contrast to the 1999 304(a) recommendation where, in the absence of the more recent mollusc data, the most sensitive genera used to develop the acute criterion were fish, which appear to be less sensitive to ammonia than freshwater mollusks.

Similarly, based on the available acquired chronic toxicity data, three of the four most sensitive genera used to develop the draft 2009 chronic criterion were freshwater molluscs. This stands in contrast to the 1999 304(a) recommendation, where only one of the four most sensitive genera used to develop the chronic criterion was a mollusc. The most important difference between the calculation of the 2009 draft chronic criteria and the 1999 304(a) recommendation is the more recent data for molluscs, particularly freshwater mussels which appear to be more sensitive to ammonia than fish (*Draft 2009 Update Aquatic Life Ambient Water Quality Criteria for Ammonia – Freshwater*, December 2009).

⁸ As per the Guidelines, whenever there are 59 or greater GMAVs in the acute criteria dataset, the FAV is calculated using the four GMAVs which have cumulative probabilities closest to 0.05. In the draft 2009 update of the acute water quality criteria for ammonia, the four GMAVs with cumulative probabilities closest to 0.05 are sensitivity rank 2-5. If there are fewer than 59 GMAVs, the four lowest GMAVs are used to calculate the FAV regardless of cumulative probabilities.

Freshwater mussels are widely distributed throughout Oregon (*Freshwater Mussels of the Pacific Northwest*, Ethan Nedreau, Allan K. Smith, Jen Stone, U.S. Fish and Wildlife Service). Given the wide distribution of freshwater mussels in Oregon, and toxicity data showing that freshwater mussels are particularly sensitive to ammonia, there is not a sound scientific rationale demonstrating that Oregon's submitted ammonia criteria protect Oregon's designated aquatic life uses, and the criteria are, therefore, inconsistent with CWA Section 303(c) and 40 CFR §131.11.

Remedies to Address EPA's Disapproval

To address this disapproval, Oregon must adopt ammonia criteria that are based on a sound scientific rationale and protect Oregon's designated aquatic life uses. There are several means by which Oregon may potentially accomplish this objective. They include:

- Revise the adopted ammonia criteria to be consistent with the 2009 draft revised national recommendations for ammonia criteria.
- Revise the ammonia criteria to ensure protection of Oregon's designated aquatic life uses. Also supply a sound scientific rationale to explain why the alternative ammonia criteria are protective of Oregon's designated aquatic life uses, taking into account any data on freshwater mussels and snails. Finally, to the extent that the adopted chronic aquatic life criterion for ammonia is less stringent than that specified by the National Marine Fisheries Services ("NMFS") to avoid jeopardy to listed species (i.e., less stringent than the value specified as a "Reasonable and Prudent Alternative" in the NMFS's August 14, 2012 biological opinion), provide additional sound scientific rationale to establish that the alternative chronic aquatic life criterion for ammonia is protective of Oregon's designated aquatic life uses, given NMFS's opinion of the effect of ammonia on Oregon's listed species.

Unless Oregon informs EPA that it intends to bring the criteria into compliance as described above, EPA will prepare and publish proposed regulations setting forth revised or new water quality criteria for the protection of Oregon's aquatic life designated uses from exposure to ammonia.

Freshwater Acute and Chronic Ammonia Aquatic Life Criteria Currently in Effect in Oregon

Until EPA approves or promulgates revisions to numeric freshwater acute and chronic aquatic life criteria for ammonia, the previously approved numeric aquatic life criteria applicable to the designated aquatic life uses in Oregon are in effect for CWA purposes. The criteria are as follows:

Acute Criterion

The 1-hour average concentration of un-ionized ammonia (mg/L NH₃) does not exceed more often than once every three years on average, the numerical value given by:

0.52/FT/FPH/2 where:

$$\begin{aligned} FT &= 10^{0.03(20-TCAP)}; & TCAP \leq T \leq 30 \text{ C} \\ FT &= 10^{0.03(20-T)}; & 0 \leq T \leq TCAP \end{aligned}$$

$$\begin{aligned} \text{FPH} &= 1 & 8 \leq \text{pH} \leq 9 \\ \text{FPH} &= \frac{1 + 10^{7.4-\text{pH}}}{1.25} & 6.5 \leq 8 \end{aligned}$$

TCAP = 20 C; Salmonids and other sensitive coldwater species present
 TCAP = 25 C; Salmonids and other sensitive coldwater species absent

(An averaging period of one hour may not be appropriate if excursions of concentrations to greater than 1.5 times the average occur during the hour; in such a case, a shorter averaging period may be needed).

Chronic Criterion

The 4-day average concentration of un-ionized ammonia (mg/L NH₃) does not exceed more often than once every three years on average, the average* numerical value given by:

$$0.80/\text{FT}/\text{FPH}/\text{RATIO}$$

where FT and FPH are as above and:

$$\begin{aligned} \text{RATIO} &= 16 & 7.7 \leq \text{pH} \leq 9 \\ \text{RATIO} &= 24 & 6.5 \leq \text{pH} \leq 7.7 \end{aligned}$$

TCAP = 15 C; Salmonids and other sensitive coldwater species present
 TCAP = 20 C; Salmonids and other sensitive coldwater species absent

(*Because these formulas are nonlinear in pH and temperature, the criterion should be the average of separate evaluation of the formulas reflective of the fluctuations of flow, pH and temperature within the averaging period, it is not appropriate in general to simply apply the formula to average pH, temperature and flow).

c) Freshwater Acute Cadmium Aquatic Life Criterion

The magnitude for the freshwater acute cadmium criterion to protect Oregon’s fish and aquatic life designated use is contained in Table 33B, which references Footnote F for the applicable equation and parameters. The applicable duration and frequency are described in the introductory language to Table 33B as a one hour average that should not be exceeded more than once in three years (see Part IV.B.1 above for EPA’s approval action for duration and frequency).

Footnote E to Table 33B states that the criteria are expressed in terms of dissolved concentrations in the water column. Footnote F also provides the conversion factors (CF) for converting a metal criterion expressed as total recoverable fraction to a criterion expressed as dissolved fraction. The freshwater acute criterion and associated conversion factor are provided below:

Chemical	Freshwater Criteria	Magnitude, dissolved	Conversion Factor (CF)
Cadmium	Acute	$(\exp(1.016 * [\ln(\text{hardness})] - 3.924)) * \text{CF}$	$1.136672 - (\ln \text{hardness})(0.041838)$

EPA Action

In accordance with its Clean Water Act authority, 33 U.S.C § 1313(c)(3) and 40 CFR Part 131, EPA disapproves the freshwater acute criterion for cadmium (as described in Footnote F) and the citation to Footnote E.

EPA Rationale

Oregon adopted EPA's 2001 304(a) recommendation for the freshwater acute aquatic life criterion for cadmium. The CWA requires EPA to publish, and from time to time, revise national criteria for water accurately reflecting the latest scientific knowledge. These criteria provide EPA's recommendations to states as they establish their water quality standards as state law. EPA recommends that where locally important or sensitive species occur, a more stringent state or site-specific criterion may be appropriate.⁹

On August 14, 2012, EPA received the final biological opinion¹⁰ of the National Marine Fisheries Service ("NMFS") regarding EPA's potential CWA approval of Oregon's revised aquatic life criteria for cadmium. With respect to the freshwater acute cadmium aquatic life criterion, NMFS stated that approving this particular criterion pursuant to CWA § 303(c) would likely jeopardize the continued existence of threatened and endangered species residing in Oregon.¹¹ NMFS believes that approval of this particular criterion would likely jeopardize listed species on the grounds that the criterion is "likely to reduce appreciably the likelihood of both the survival and recovery of the listed species, and [is] likely to reduce appreciably the conservation value of their critical habitats."¹²

In light of the recent finalization of the biological opinion, the new information presented in the biological opinion and similar information considered by other states, and the potential input into each Agency's current evaluation processes by an ongoing National Academy of Sciences (NAS) panel, EPA has not had sufficient opportunity to evaluate the validity of NMFS' conclusions regarding potential jeopardy to listed species, nor to evaluate the need for (and potential implementation of) alternatives. NMFS' concerns relevant to evaluating effects of cadmium on listed species are at the frontier of scientific understanding, such that they are currently under consideration by the above-noted NAS panel. EPA recognizes that to the extent NMFS's concerns about the revised acute cadmium criterion are scientifically valid, they may influence EPA's later conclusions about whether the revised criterion is: (1) based on sound scientific rationale and (2) sufficient to protect the designated uses of Oregon waters.

The administrative record, in its current state of analysis, is not sufficient to provide a sound scientific rationale for approval of this criterion. Because EPA has a legal obligation to act on

⁹ For example, in Idaho, a more stringent state specific adjustment to the national acute criterion was necessary to ensure the protection of an important salmonid species residing in Idaho (*Oncorhynchus clarkii*). This same species reside throughout Oregon, therefore this species may be at risk in Oregon.

¹⁰ *Jeopardy and Adverse Modification of Critical Habitat Biological Opinion for the Environmental Protection Agency's Proposed Approval of Certain Oregon Administrative Rules Related to Revised Water Quality Criteria for Toxic Pollutants*, National Marine Fisheries Service, Northwest Region, NMFS Consultation Number 2008/00148. ("Biological Opinion")

¹¹ Biological Opinion at 547-8.

¹² Biological Opinion at 548.

the submission under CWA § 303(c) by January 31, 2013,¹³ and in light of the unresolved issues noted above, EPA disapproves the acute cadmium criterion because it is not based on a sound scientific rationale given the evolving nature of the data and science.

Remedy to Address Disapproval Action

To meet the requirements of the CWA, Oregon must develop a criterion with a sound scientific rationale demonstrating that it is protective of the aquatic life designated use, given the data regarding cadmium's scientifically demonstrated effects, and given the concerns raised in the NMFS biological opinion. As described above, EPA has not completed its technical analysis of the biological opinion such that it can recommend a specific numeric criterion protective of Oregon aquatic life at this time. Additionally, new scientific data on the toxicity of cadmium is now available and would need to be reviewed regarding their quality and relevance prior to being considered in developing an updated recommendation for a specific numeric criterion protective of Oregon aquatic life. EPA will collaborate with NMFS and Oregon to determine an appropriate criterion by (1) considering the scientific bases of the NMFS opinion, (2) evaluating the data used by the State of Idaho to develop its acute cadmium criterion, and (3) evaluating any new data that may be available and meets appropriate quality assurance requirements.

Unless Oregon informs EPA that it intends to bring the criteria into compliance as described above, EPA will prepare and publish proposed regulations setting forth a revised or new water quality criterion for the protection of Oregon aquatic life from acute exposure to cadmium.

Freshwater Aquatic Life Criteria Currently in Effect in Oregon

Until EPA approves or promulgates revisions to numeric freshwater acute aquatic life criteria for acute cadmium, the pre-2004 acute criterion for cadmium remains in effect for CWA purposes. This criterion is expressed as total recoverable and is a one hour average that is not to be exceeded more than once in three years. The equation is:

$$\text{Acute criterion} = \exp(1.128[\ln(\text{hardness})] - 3.828)$$

d) Freshwater Acute and Chronic Copper Aquatic Life Criteria

The magnitude for the freshwater acute and chronic copper criteria to protect Oregon's fish and aquatic life designated use are contained in Table 33B, which references Footnote F for the applicable equation and parameters. The applicable duration and frequency are described in the introductory language to Table 33B as a one-hour average that should not be exceeded more than once in three years for the acute criterion, and a four-day average that should not be exceeded more than once in three years for the chronic criterion (see Part IV.B.1. above for EPA's approval action for duration and frequency).

Footnote E to Table 33B states that the copper criteria are expressed in terms of dissolved concentrations in the water column. Footnote F also provides the conversion factors (CF) for converting a metal criterion expressed as total recoverable fraction to a criterion expressed as the dissolved fraction.

¹³ Northwest Environmental Advocates v. United States Environmental Protection Agency, No. 6-cv-00479 (November 27, 2012) (consent decree providing that "EPA shall complete its final action approving and/or disapproving the aquatic life criteria no later than January 31, 2013.")

The freshwater criteria and associated conversion factors are provided below:

Chemical	Freshwater Acute/Chronic	Magnitude, dissolved	Conversion Factor (CF)
Copper	acute	$(\exp(0.9422 * [\ln(\text{hardness})] - 1.700)) * \text{CF}$	0.960
	chronic	$(\exp(0.8545 * [\ln(\text{hardness})] - 1.702)) * \text{CF}$	0.960

EPA Action

In accordance with its Clean Water Act authority, 33 U.S.C § 1313(c)(3) and 40 CFR Part 131, EPA disapproves the freshwater acute and chronic criteria for copper (as described in Footnote F) and the citations to Footnote E.

EPA Rationale

Oregon adopted EPA’s 1995 304(a) recommendations for freshwater acute and chronic aquatic life criteria for copper. The 1995 values were the most recent 304(a) recommendation at the time Oregon adopted its copper criteria in 2004. The 1995 304(a) recommendation for freshwater aquatic life criteria for copper were developed by relating the toxic effect concentration of copper to water hardness. However, subsequent studies have shown that hardness itself is not the most accurate determinant of copper toxicity. Rather than use hardness as a surrogate, it is more accurate to directly consider the suite of separate water quality variables (pH, alkalinity, and a number of specific ion concentrations such as calcium, sodium, etc.) that often correlate with hardness in natural waters (and the lab water used in conducting the toxicity tests that underlie the criteria).

There are many natural waters where hardness does not correlate well with other water quality variables in regards to copper toxicity. Additionally, hardness may not correlate well with other water quality variables in waterbodies influenced by discharges from treatment processes, storm water runoff, agricultural runoff and other factors that create ambient water chemistry that may be very different from a natural condition (or water chemistry used in conducting the toxicity tests which underlie the hardness-dependent criteria). Thus the hardness-dependent copper criterion is potentially under-protective or over-protective depending on the site-specific ambient water chemistry.

In February 2007, EPA updated its national recommended aquatic life criteria for copper to include new data that became available since the 1995 304(a) criteria were developed, and to incorporate a more advanced modeling approach for developing water quality-dependent criteria (*Aquatic Life Ambient Freshwater Quality Criteria-Copper, 2007 Revision*, EPA-822-R-07-001, February 2007). This update incorporates the use of the biotic ligand model (the “BLM,” a metal bioavailability model) in the criteria derivation procedures. The BLM takes, as input, receiving water body monitoring data. It enables the development of site-specific water quality criteria using these inputs. The BLM requires ten input variables from the ambient water to calculate a freshwater copper criterion: temperature, pH, dissolved organic carbon (DOC), calcium, magnesium, sodium, potassium, sulfate, chloride, and alkalinity. Criteria that incorporate the BLM can be tailored to the site-specific water chemistry of a water body and thus ensure the protection of the aquatic life use, whereas the hardness-dependent criteria may or may not be

protective of the aquatic life use, depending on the correlation in a particular water body between the suite of water quality variables that affect copper toxicity, and the site-specific hardness.

EPA is disapproving the copper criteria for protection of aquatic life because it is inconsistent with CWA Section 303(c) and 40 CFR § 131.11. Oregon relied on the EPA's 1995 304(a) recommended criterion, which was superseded by the BLM in 2007. Given what is now known about the improved accuracy of the BLM compared to the 1995 304(a) recommendation, and given that Oregon's submission of revised copper criteria does not include a sound scientific rationale to explain why the 1995 national recommended values will nevertheless suffice to protect Oregon's designated aquatic life uses, EPA believes that the submitted acute and chronic aquatic life criteria for copper lack a sound scientific rationale as required by 40 CFR § 131.11(a) and CWA Section 303(c).

Remedies to Address EPA's Disapproval

There are several potential options Oregon could consider in establishing copper criteria that are based on scientifically defensible methods and protect Oregon's designated aquatic life uses, including:

- Replace the hardness-dependent copper criteria with the BLM contained in EPA's 2007 304(a) recommended criteria for copper, addressing NMFS Oregon specific analysis for copper in the NMFS August 14, 2012 Biological Opinion. The BLM may be used on a specific stream segment to calculate the applicable site-specific acute and chronic copper criteria when the site-specific water chemistry needed to run the BLM is available. Site-specific data must account for temporal and spatial variability to ensure that the derived criteria are protective of designated uses.

Oregon-specific water quality data may be used in the BLM to develop state-wide default acute and chronic criteria for copper (alternatively, the state may be divided into regions with similar characteristics and default criteria may be developed for each region).

- Revise the hardness-dependent copper criteria to protect Oregon's designated aquatic life uses. In developing such criteria, give due consideration NMFS's Oregon-specific analysis of EPA's pre-BLM 304(a) recommended criteria for copper (in the NMFS August 14, 2012 Biological Opinion). Supply a sound scientific rationale to establish that Oregon's revised hardness-based copper criteria are protective of Oregon's designated aquatic life uses, addressing NMFS's concerns about EPA's pre-BLM nationally recommended criteria to the extent such concerns are also relevant to the protectiveness analysis for Oregon's revised criteria.
- Re-submit the pre-BLM hardness-dependent copper criteria with additional scientific basis (including due consideration of the Oregon-specific analysis of the EPA's pre-BLM 304(a) recommended criteria for copper included in the August 14, 2012 Biological Opinion of the National Marine Fisheries Service), to establish that Oregon's pre-BLM hardness-dependent criteria are protective of Oregon's designated aquatic life uses.

Unless Oregon informs EPA that it intends to bring the criteria into compliance as described above, EPA will prepare and publish proposed regulations setting forth revised or new water

quality criteria for the protection of Oregon’s aquatic life designated uses from exposure to copper.

Freshwater Copper Aquatic Life Criteria Currently in Effect in Oregon

Until Oregon adopts and EPA approves revisions to numeric freshwater acute and chronic aquatic life criteria for copper, the previously approved numeric aquatic life criteria applicable to the designated aquatic life uses in Oregon are in effect for CWA purposes. The acute criterion is expressed as a 1-hour average not to be exceeded more than once in three years and the chronic criterion is expressed as a 4-day average not to be exceeded more than once in three years; the acute and chronic criterion are expressed as total recoverable, and the numeric values are:

$$\text{CMC (acute criterion)} = \exp(0.9422[\ln(\text{hardness})]-1.464)$$

$$\text{CCC (chronic criterion)} = \exp(0.8545[\ln(\text{hardness})]- 1.465)$$

Note: hardness is expressed as mg/L CaCO₃

*e) **Freshwater Acute and Chronic Selenium Aquatic Life Criteria***

The magnitudes for the freshwater acute and chronic selenium criteria to protect Oregon’s fish and aquatic life designated use are contained in Table 33B, which provides a numeric concentration for the chronic criterion, and references Footnote V for an equation and applicable parameters for the acute criterion. The applicable duration and frequency are described in the introductory language to Table 33B as a one-hour average that should not be exceeded more than once in three years for the acute criterion, and a four-day average that should not be exceeded more than once in three years for the chronic criterion (see Part IV.B.1 above for EPA’s approval action for duration and frequency).

A citation to Footnote E provides that these criteria are expressed in terms of dissolved concentrations in the water column. The criteria subject to EPA review are:

Selenium	Criterion, expressed as dissolved	Comments
Acute (µg/L)	$1/[(f1/CMC1)+(f2/CMC2)]$	f1 and f2 are the fractions of total selenium that are treated as selenite and selenate, respectively, and CMC1 and CMC2 are 185.9 µg/L and 12.82 µg/L, respectively.
Chronic (µg/L)	5	N/A

EPA Action

In accordance with its Clean Water Act authority, 33 U.S.C § 1313(c)(3) and 40 CFR § 131, EPA disapproves the magnitudes for freshwater acute selenium criterion found in Footnote V (and cited in table 33B), and the chronic selenium criterion found in Table 33B, and the citations to Footnote E.

EPA Rationale

Oregon adopted criteria that are numerically consistent with the magnitudes identified in EPA’s 304(a) recommendation. However, EPA’s 304(a) recommended values are expressed as total

recoverable concentrations in the water column, whereas the selenium criteria adopted by Oregon are expressed as the *dissolved* concentrations in the water column. EPA has indicated that it believes it is scientifically acceptable to use a conversion factor (CF) of 0.996 for the acute criterion and a CF of 0.922 for the chronic criterion to convert the total recoverable value to a dissolved value (see *National Recommended Water Quality Criteria:2002*, EPA-822-R-02-047, Footnote T). Applying the CFs would result in the following criteria as dissolved:

Acute (µg/L, dissolved): $1/[(f1/CMC1)+(f2/CMC2)] \mu\text{g/L} \times 0.996$

Chronic (µg/L, dissolved): $5 \mu\text{g/L} \times 0.922 = 4.6 \mu\text{g/L}$

Because Oregon expressed these criteria as dissolved without applying the appropriate conversion factors (0.996 for acute and 0.992 for chronic), Oregon effectively has adopted acute and chronic aquatic life selenium criteria that are slightly higher (less stringent) than EPA's 304(a) recommendations for these values. Oregon did not provide supporting documentation to demonstrate that these less stringent values would nevertheless be protective of designated aquatic life uses in Oregon. Therefore, the EPA is disapproving the revised freshwater acute and chronic aquatic life criteria for selenium contained in Table 33B, including the reference to Footnote E.

Remedies to Address EPA's Disapproval

To address this disapproval, Oregon must adopt selenium criteria that are based on a sound scientific rationale and protect Oregon's designated aquatic life uses. There are several means by which Oregon may potentially accomplish this objective. They include:

- Revise the acute and chronic aquatic life criteria for selenium by incorporating the application of the recommended conversion factors (0.996 for acute criteria, and 0.922 for chronic criteria), consistent with EPA's approach for developing dissolved criteria. Also incorporate the additional scientific data that have become available regarding selenium toxicity since Oregon's 2004 submission to determine if additional revisions to the criteria are needed to protect Oregon's designated aquatic life uses.
- Otherwise, revise the acute and chronic aquatic life criteria for selenium by incorporating the application of the recommended conversion factors (0.996 for acute criteria, and 0.922 for chronic criteria), consistent with EPA's approach for developing dissolved criteria. Also supply a sound scientific rationale why the additional scientific data that have become available since Oregon's 2004 submission (respecting selenium toxicity) do not require further revisions to these criteria to protect Oregon's designated aquatic life uses.
- Resubmit the previously adopted acute and chronic selenium criteria with a sound scientific rationale, to establish that the application of conversion factors (0.996 for acute criteria, and 0.922 for chronic criteria) are unnecessary to protect Oregon's designated aquatic life uses. Also supply a sound scientific rationale why the additional scientific data that have become available since Oregon's 2004 submission (regarding selenium toxicity) do not require further revisions to the these criteria to protect Oregon's designated aquatic life uses.
- Develop new acute and chronic aquatic life criteria for selenium to account for additional scientific data that have become available regarding selenium toxicity since Oregon's 2004 submission.

Freshwater Aquatic Life Criteria Currently in Effect in Oregon

Until EPA approves or promulgates revisions to numeric freshwater acute and chronic aquatic life criteria for selenium, the previously approved numeric aquatic life criteria applicable to the designated aquatic life uses in Oregon are in effect for CWA purposes. The acute criterion is expressed as a 1-hour average not to be exceeded more than once in three years and the chronic criterion is expressed as a 4-day average not to be exceeded more than once in three years; the acute and chronic criterion are expressed as total recoverable, and the numeric values are:

Acute criterion: 260 µg/L

Chronic criterion: 35 µg/L

5. EPA's Action on the New Footnotes In Table 33B

This section of the document addresses the footnotes in Table 33B. Oregon added Footnotes A through X¹⁴ but subsequently eliminated Footnotes B, G, H, J, K, L, Q, and added Footnote Y.

Footnote A

A Values in Table 20 are applicable to all basins.

EPA Action

In accordance with its Clean Water Act authority, 33 U.S.C § 1313(c)(3) and 40 CFR § 131, EPA is disapproving this footnote, which directs the reader to the incorrect table. Oregon has explained to EPA that this is an error and Oregon intends to correct the footnote to read “Values in Table 33B are applicable to all basins” (see October 3, 2012 letter from Greg Aldrich, ODEQ to Daniel Opalski, EPA).

Remedy to Disapproval Language

Change the text in Footnote A to “Values in Table 33B are applicable to all basins.”

Narrative Language Currently in Effect in Oregon

OAR 340-041-0033(3) has been approved by EPA and is in effect for CWA purposes; it states: “Levels of toxic substances in waters of the state may not exceed the applicable aquatic life criteria listed in Tables 20, 33A, and 33B....” This language correctly requires the aquatic life criteria in Table 33B to be applied to all waters of the state.

Footnote C

C Ammonia criteria for freshwater may depend on pH, temperature, and the presence of salmonids or other fish with ammonia-sensitive early life stages. Values for freshwater criteria (of total

¹⁴ In the 2004 water quality standards adoption all of the Footnotes for Table 33A and Table 33B were contained at the end of Table 33B. In the 2011 water quality standards adoption, Oregon removed all of the footnotes associated with human health criteria because the human health criteria were removed from Table 33A and incorporated into a new Table 40. In the 2011 water quality standards adoption Oregon also included all of the footnotes at the end of Table 33A, and retained all the footnotes at the end of Table 33B except for the human health related footnotes, additionally in 2011 footnote Y was added to Table 33B.

ammonia nitrogen in mg N/L) can be calculated using the formulae specified in 1999 Update of Ambient Water Quality Criteria for Ammonia (EPA-822-R-99-014; <http://www.epa.gov/ost/standards/ammonia/99update.pdf>):

Freshwater Acute:

$$\text{salmonids present....CMC} = \frac{0.275}{1 + 10^{7.204-pH}} + \frac{39.0}{1 + 10^{pH-7.204}}$$

$$\text{salmonids not present...CMC} = \frac{0.411}{1 + 10^{7.204-pH}} + \frac{58.4}{1 + 10^{pH-7.204}}$$

Freshwater Chronic:

fish early life stages present:

$$CCC = \frac{0.0577}{1 + 10^{7.688-pH}} + \frac{2.487}{1 + 10^{pH-7.688}} * \text{MIN}(2.85, 1.45 * 10^{0.028*(25-T)})$$

fish early life stages not present:

$$CCC = \frac{0.577}{1 + 10^{7.688-pH}} + \frac{2.487}{1 + 10^{pH-7.688}} * 1.45 * 10^{0.028*(25-\text{MAX}(T,7))}$$

Note: these chronic criteria formulae would be applied to calculate the 30-day average concentration limit; in addition, the highest 4-day average within the 30-day period should not exceed 2.5 times the CCC.

EPA Action

EPA is disapproving the criteria for freshwater ammonia, which includes a disapproval of Footnote C. EPA's action on the freshwater ammonia criteria in Footnote C is discussed in Part IV.B.4(b) (Freshwater Acute and Chronic Ammonia Aquatic Life Criteria)

Footnote D

D Ammonia criteria for saltwater may depend on pH and temperature. Values for saltwater criteria (total ammonia) can be calculated from the tables specified in Ambient Water Quality Criteria for Ammonia (Saltwater)--1989 (EPA 440/5-88-004; <http://www.epa.gov/ost/pc/ambientwqc/ammoniasalt1989.pdf>).

EPA Action

This footnote is not applicable to any criteria in Table 33B because there is no citation to this footnote anywhere in Table 33B. Additionally, Footnote D to Table 33A sets forth the same criteria for ammonia that is described above, and Footnote D is cited in Table 33A. Therefore, EPA's decision regarding this footnote is set forth above in Part III.B.5 (EPA's Action on Footnotes in Table 33A).

EPA recommends the State delete this footnote from Table 33B since there is no citation to the footnote in Table 33B.

Footnotes E

E Freshwater and saltwater criteria for metals are expressed in terms of "dissolved" concentrations in the water column, except where otherwise noted (e.g. aluminum).

EPA Action

In accordance with its Clean Water Act authority, 33 U.S.C § 1313(c)(3) and 40 CFR § 131, EPA approves expressing the metals criteria in terms of the “dissolved” concentrations in the water column.

Rationale

EPA derives its national aquatic life criteria so that they protect water-column organisms from exposure to pollutants that are present in the water column. The primary mechanism for water column toxicity is adsorption at the gill surface which requires metals to be in the dissolved form.

The scientific evidence indicates that particulate-bound metals do not contribute toxicity when suspended in the water column. Two expert workshops, one in Annapolis in 1993 (58 FR 32131, June 8, 1993) and one in Pensacola in 1996 (Bergman, H.L. and E.J. Dorward-Kind (eds.), *Reassessment of Metal Criteria for Aquatic Life Protection*. SETAC Press. Pensacola, FL. 1997) were held to discuss this issue. Both workshops recommended that EPA express its aquatic life criteria for metals in terms of dissolved metal. EPA agrees with the recommendations of the expert workshops and with the supporting rationales. Therefore, EPA now expresses its aquatic life criteria for metals in terms of dissolved metal instead of total recoverable metal because dissolved metal more closely approximates bioavailable metal in the water column than does total recoverable metal.¹⁵

Footnote F

F The freshwater criterion for this metal is expressed as a function of hardness (mg/L) in the water column. Criteria values for hardness may be calculated from the following formulae (CMC refers to Acute Criteria; CCC refers to Chronic Criteria):

$$\begin{aligned} CMC &= (\exp(m_A * [\ln(\text{hardness})] + b_A)) * CF \\ CCC &= (\exp(m_C * [\ln(\text{hardness})] + b_C)) * CF \end{aligned}$$

where CF is the conversion factor used for converting a metal criterion expressed as the total recoverable fraction in the water column to a criterion expressed as the dissolved fraction in the water column.

Chemical	m_A	b_A	m_C	b_C
Cadmium	1.0166	-3.924	0.7409	-4.719
Chromium III	0.8190	3.7256	0.8190	0.6848
Copper	0.9422	-1.700	0.8545	-1.702
Lead	1.273	-1.460	1.273	-4.705
Nickel	0.8460	2.255	0.8460	0.0584
Silver	1.72	-6.59		
Zinc	0.8473	0.884	0.8473	0.884

Conversion factors (CF) for dissolved metals (the values for total recoverable metals criteria were multiplied by the appropriate conversion factors shown below to calculate the dissolved metals criteria):

¹⁵ Water Quality Guidance for the Great Lakes System: Supplementary Information Document (SID), 1995, EPA 820-B-95-001. http://www.epa.gov/region5/water/wqs5/pdf/supp_inf_doc.pdf

Chemical	Freshwater		Saltwater	
	Acute	Chronic	Acute	Chronic
Arsenic	1.000	1.000	1.000	1.000
Cadmium	$1.136672 - [(\ln \text{hardness})(0.041838)]$	$1.101672 - [(\ln \text{hardness})(0.041838)]$	0.994	0.994
Chromium III	0.316	0.860		
Chromium VI	0.982	0.962	0.993	0.993
Copper	0.960	0.960	0.83	0.83
Lead	$1.46203 - [(\ln \text{hardness})(0.145712)]$	$1.46203 - [(\ln \text{hardness})(0.145712)]$	0.951	0.951
Nickel	0.998	0.997	0.990	0.990
Selenium	0.996	0.922	0.998	0.998
Silver	0.85	0.85	0.85	--
Zinc	0.978	0.986	0.946	0.946

EPA Action

EPA's action on each of the above can be found in this document in the following locations:

Chemical	Freshwater		Saltwater	
	Acute	Chronic	Acute	Chronic
Arsenic	Part IV.B.2	Part IV.B.2	Part IV.B.2	Part IV.B.2
Cadmium	Part IV.B.4(c)	Part IV.B.3(a)	Part IV.B.3(a)	Part IV.B.3(a)
Chromium III	Part IV.B.3(a)	Part IV.B.3(a)	N/A	N/A
Chromium VI	Part IV.B.3(a)	Part IV.B.3(a)	Part IV.B.2	Part IV.B.2
Copper	Part IV.B.4(d)	Part IV.B.4(d)	Part IV.B.3(a)	Part IV.B.3(a)
Lead	Part IV.B.3(a)	Part IV.B.3(a)	Part IV.B.3(a)	Part IV.B.3(a)
Nickel	Part IV.B.3(a)	Part IV.B.3(a)	Part IV.B.3(a)	Part IV.B.3(a)
Selenium	Part IV.B.4(e)	Part IV.B.4(e)	Part IV.B.3(a)	Part IV.B.3(a)
Silver	Part IV.B.3(a)	Part IV.B.3(a)	Part IV.B.3(a)	N/A
Zinc	Part IV.B.3(a)	Part IV.B.3(a)	Part IV.B.3(a)	Part IV.B.3(a)

Footnote I

I This value is base on criterion published in Ambient Water Quality Criteria for Endosulfan (EPA 440/5-80-046) and should be applied as the sum of alpha and beta-endosulfan.

EPA Action

This footnote is not applicable to any criteria in Table 33B because there is no citation to this footnote anywhere in Table 33B. Additionally, Footnote I to Table 33A sets forth the same information that is described above, and Footnote I is cited in Table 33A. Therefore, EPA's decision regarding this footnote is set forth above in Part III.B.5 (EPA's Action on Footnotes in Table 33A), Footnote I.

EPA recommends that Oregon remove this footnote from Table 33B since there are no citations to the footnotes in Table 33B.

Footnote M

M Freshwater aquatic life values for pentachlorophenol are expressed as a function of pH, and are calculated as follows: $CMC = \exp(1.005(pH) - 4.869)$; $CCC = \exp(1.005(pH) - 5.134)$.

EPA Action

The CMC for this criterion is set forth in Table 33A, therefore EPA's decision regarding the CMC is set forth in Part III.B.2 above. The CCC is contained in Table 33B, EPA's decision on the CCC is set forth in Part IV.B.3(b) above.

EPA recommends that Oregon remove the CMC value from Footnote M of Table 33B because the CMC for pentachlorophenol is contained in Table 33A.

Footnote N

N This number was assigned to the list of non-priority pollutants in National Recommended Water Quality Criteria: 2002 (EPA-822-R-02-047).

EPA Action

EPA approves this footnote as a non-substantive editorial change. In 2002, EPA published a compilation of national recommended 304(a) recommendations (*National Recommended Water Quality Criteria: 2002*). One of the tables in EPA's compilation contained a numbered list of non-priority pollutants. Oregon has simply copied the numbers associated with each non-priority pollutant from EPA's 2002 list into their water quality standards. EPA acknowledges this minor editorial change and approves the non-substantive editorial change.

Footnote O

This criterion is based on EPA recommendations issued in 1980 that were derived using guidelines that differed from EPA's 1985 Guidelines for minimum data requirements and derivation procedures. For example, a "CMC" derived using the 1980 Guidelines was derived to be used as an instantaneous maximum. If assessment is to be done using an averaging period, the values given should be divided by 2 to obtain a value that is more comparable to a CMC derived using the 1985 Guidelines.

EPA Action

This footnote is not applicable to any criteria in Table 33B because there is no citation to this footnote anywhere in Table 33B. Additionally, Footnote O to Table 33A sets forth the same language that is described above, and Footnote O is cited in Table 33A. Therefore, EPA's decision regarding this footnote is set forth in Part III.B.5, Footnote O (EPA's Action on Footnotes in Table 33A).

EPA recommends that Oregon delete this footnote from Table 33B since there is no citation to the footnote in Table 33B.

Footnote P

P Criterion shown is the minimum (i.e. CCC in water should not be below this value in order to protect aquatic life).

EPA Action

In accordance with its Clean Water Act authority, 33 U.S.C § 1313(c)(3) and 40 CFR § 131, EPA is disapproving the addition of footnote P in Table 33B.

EPA Rationale

Oregon applies Footnote P to the freshwater and saltwater acute criterion for silver. In a letter dated October 3, 2012 from Greg Aldrich ODEQ to Daniel Opalski, EPA, Oregon acknowledged that Footnote P is an error and should be removed.

Footnote P states that a water body should have an amount of silver in the water body that is no less than the acute criterion value. In other words, a silver concentration in the water greater than the acute criterion would meet this criterion. This use of the criterion is inconsistent with EPA's 304(a) recommendation, which states that the acute criterion is the maximum amount of silver that may be in a water body without causing adverse effects to aquatic life uses.

Since Oregon acknowledge that Footnote P is an error and should be removed, and because there is no supporting documentation to show that using the silver criterion as described in Footnote P is protective of aquatic life designated uses, EPA is disapproving this footnote.

Remedy to Address EPA Disapproval

This disapproval can be addressed by removing Footnote P from Table 33B.

Footnote R

R Arsenic criteria refer to the inorganic form only.

EPA Action

Footnote R was adopted in Oregon's 2004 water quality standards revision but was not applied to any aquatic life criteria Table 33B (or Table 33A); rather Footnote R was applied to the *human health criteria* for arsenic contained in Table 33A. EPA disapproved footnote R as it applied to the arsenic human health criteria in its June 1, 2010 action (see *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*, June 1, 2010).

In its 2011 water quality standard revision, Oregon moved the human health criteria and associated footnote to Table 40. But it appears that the State inadvertently retained Footnote R in the footnotes to Table 33B. At this time, EPA is not taking action on Footnote R as it is not a water quality standard. There is no citation to Footnote R in Table 33B therefore the footnote does not establish a legally binding requirement under State law nor does it describe a desired ambient condition of a water body to support a particular designated use. Therefore the footnote is not considered a water quality standard subject to EPA review and approval under 303(c) of the CWA, and EPA is taking no action to approve or disapprove the footnote.

EPA recommends that Oregon delete Footnote R from Table 33B since there is no citation to the footnote in Table 33B.

Footnotes S, T, U

S This criterion is expressed as µg free cyanide (CN)/L.

- T This criterion applies to DDT and its metabolites (i.e. the total concentration of DDT and its metabolites should not exceed this value).*
- U This criterion applies to total PCBs (e.g. the sum of all congener or all isomer or homolog or Arochlor analyses).*

EPA Action

Footnotes S, T, and U are not applicable to any criteria in Table 33B because there is no citation to these footnotes anywhere in Table 33B. Additionally, Footnotes S, T, and U to Table 33A set forth the same information that is described above for these footnotes. Furthermore, Footnotes S, T, U are cited in Table 33A. Therefore, EPA's decision regarding these footnotes is set forth in Part III.B.5 (EPA's Action on Footnotes in Table 33A).

EPA recommends the State delete these footnotes from Table 33B since there are no citations to these footnotes in Table 33B.

Footnote V

V The $CMC = 1 / [(f1/CMC1) + (f2/CMC2)]$ where $f1$ and $f2$ are the fractions of total selenium that are treated as selenite and selenate, respectively, and $CMC1$ and $CMC2$ are $185.9 \mu\text{g/L}$ and $12.82 \mu\text{g/L}$, respectively.

EPA Action

EPA is disapproving the criteria for freshwater acute selenium, which includes a disapproval of Footnote V. EPA's action on the freshwater acute selenium criterion in Footnote V is discussed in Part IV.B.4(e) (Freshwater Acute and Chronic Selenium Criteria).

Footnote W

W The acute and chronic criteria for aluminum are $750 \mu\text{g/L}$ and $87 \mu\text{g/L}$, respectively. These values for aluminum are expressed in terms of "total recoverable" concentration of metal in the water column. The criterion applies at $\text{pH} < 6.6$ and hardness $< 12 \text{ mg/L}$ (as CaCO_3).

EPA Action

EPA is disapproving the criteria for freshwater aluminum, which includes a disapproval of Footnote W. EPA's action on the freshwater aluminum criteria in Footnote W is discussed in Part IV.B.4(a) (Freshwater Aluminum Acute and Chronic Aquatic Life Criteria).

Footnote X

X The effective date for the criterion in the column immediately to the left is 1991.

EPA Action

This footnote is not applicable to any criteria in Table 33B because there is no citation to this footnote anywhere in Table 33B. Additionally, Footnote X to Table 33A sets forth the same information that is described above, and Footnote X is cited in Table 33A. Therefore, EPA's decision regarding this footnote is set forth in Part III.B.5 (EPA's Action on Footnotes in Table 33A), Footnote X.

EPA recommends Oregon delete this footnote from Table 33B since there is no citation to the footnote in Table 33B.

Footnote Y

Y No criterion.

EPA Action

This footnote is not applicable to any criteria in Table 33B because there is no citation to this footnote anywhere in Table 33B. Because this footnote does not apply to any criteria in Table 33B, it does not establish a legally binding requirement under State law nor does it describe a desired ambient condition of a water body to support a particular designated use. Therefore the footnote is not considered a water quality standard subject to EPA review and approval under 303(c) of the CWA, and EPA is taking no action to approve or disapprove the new footnote.

EPA recommends Oregon delete this footnote from Table 33B since there is no citation to the footnote in Table 33B.

6. Non-substantive Formatting Changes in Table 33B

Oregon adopted new human health criteria in 2011 and created a new Table 40 which contains all the human health criteria. Therefore, Oregon removed all references to human health criteria in the introductory paragraph to Table 33B, and removed Footnotes B, G, H, J, K, and L which all referred to the human health criteria.¹⁶ Additionally, Oregon inadvertently removed footnote Q, which was applicable to the aquatic life arsenic criteria that were inadvertently removed in the 2007 water quality standards revision (see Part IV.B.2 for a more detailed explanation).

EPA Action

EPA acknowledges the editorial changes made to the introductory paragraph of Table 33B, and the removal of the footnotes. EPA approves these changes as non-substantive formatting changes.

EPA has recommended that Oregon adopt the aquatic life arsenic criteria that were inadvertently deleted in 2007. EPA also recommends that Oregon adopt the associated Footnote Q that affects how arsenic is applied.

¹⁶ Oregon's 2004 water quality standards contained all footnotes applicable to Tables 33A and 33B at the end of Table 33B. Additionally, the introductory language to Table 33B contained references to human health criteria even though the table did not contain any human health criteria.

V. EPA'S ACTION ON REVISIONS TO TABLE 20

A. Introductory Language to Table 20

As stated previously, when Oregon submitted its 2004 revisions to the Oregon water quality standards it envisioned that once the EPA approved the new Tables 33A and 33B, Table 20 would become obsolete because Tables 33A and 33B would contain either the same, revised, or new criteria for all of the parameters in Table 20. However, if EPA did not approve a new or revised criterion then the criterion in Table 20 remain in effect.

As part of the 2004 adoption, Oregon revised the introductory language to Table 20. Further revisions were made to the introductory language as part of its 2011 adoption by removing references to human health criteria that were contained in the introductory language. All of the revisions to the introductory language are provided below. Strikeout text indicates language that has been removed and underlined language indicates language that is new.

~~The concentration for each compound listed in this chart is a criteria or guidance value* not to be exceeded in waters of the state for the protection of aquatic life and human health. Specific descriptions of each compound and an explanation of values are included in Quality Criteria for Water (1986). Selecting values for regulatory purposes will depend on the most sensitive beneficial use to be protected, and what level of protection is necessary for aquatic life and human health.~~ The concentration for each compound listed in Table 20 is a criterion not to be exceeded in waters of the state in order to protect aquatic life and human health. All values are expressed as micrograms per liter (µg/L) except where noted. Compounds are listed in alphabetical order with the corresponding designations as to whether EPA has identified it as a priority pollutant and a carcinogen, aquatic life freshwater acute and chronic criteria, aquatic life marine acute and chronic criteria, human health water & organism and fish consumption only criteria, and Drinking Water Maximum Contaminant Level (MCL). The acute criteria refer to the average concentration for one (1) hour and the chronic criteria refer to the average concentration for 96 hours (4 days), and that these criteria should not be exceeded more than once every three (3) years.

EPA Action

In accordance with its Clean Water Act authority, 33 U.S.C § 1313(c)(3) and 40 CFR § 131, EPA is disapproving the revisions to the introductory language to Table 20.

EPA Rationale

The new introductory language specifically identifies the duration and frequency of all acute criteria as the average concentration for one hour that should not be exceeded more than once every three years, and identifies the duration and frequency of chronic criteria as the average concentration for 4 days that should not be exceeded more than once every three years. Prior to the 2004 water quality standard revision, the introductory language to Table 20 stated: "...Specific descriptions of each compound and an explanation of values are included in Quality Criteria for Water (1986)..." The *Quality Criteria for Water* (1986) provided the frequency and duration periods for each of the chemicals in Table 20.

As discussed in Part III.B.3(Disapproval Action for Revised Aquatic Life Criteria in Table 33A) of this document, EPA is disapproving the revised criteria for Aldrin (freshwater acute criterion and saltwater acute criteria), Lindane (freshwater chronic criterion, saltwater acute criterion), Chlordane (freshwater acute and chronic criteria, and saltwater acute and chronic criteria), DDT 4,4 (freshwater acute and

chronic criteria, and saltwater acute and chronic criteria), Dieldrin (saltwater acute and chronic criteria), Endrin (saltwater acute and chronic criteria), Heptachlor (freshwater acute and chronic criteria and saltwater acute and chronic criteria), and Endosulfan (freshwater acute and chronic criteria and saltwater acute and chronic criteria). EPA is disapproving these specific criteria because the frequency and duration periods were changed when these criteria were moved from Table 20 to Table 33A. Specifically, the acute criteria were revised from a maximum value not to be exceeded to a one-hour average not to be exceeded more than once every three years; and the chronic criteria were revised from a 24-hour average to a four-day average not be exceeded more than once every three years. When EPA disapproves a revised criterion the previously adopted numeric criteria for aquatic life protection are effective for CWA purposes. In order to ensure that the previously adopted numeric criteria for these specific criteria are effective, EPA is disapproving the new introductory language to Table 20 to ensure that the frequency and duration period for the above referenced chemicals is retained (i.e., acute criterion are expressed as a maximum value not be exceeded and the chronic criterion is expressed as a 24-hour average).

Remedies of Address EPA's Disapproval

This disapproval may be addressed in the same manner as the remedies laid out in Part III.B.3 (Disapproval Action for Changes to Aquatic Life Criteria Moved From Table 20 to Table 33A)

Water Quality Standards Currently in Effect in Oregon

Until EPA approves or promulgates revisions to Oregon's introductory language to Table 20, the previously approved language is in effect for CWA purposes. The applicable language is as follows:

The concentration for each compound listed in this chart is a criteria or guidance value* not to be exceeded in waters of the state for the protection of aquatic life and human health. Specific descriptions of each compound and an explanation of values are included in Quality Criteria for Water (1986). Selecting values for regulatory purposes will depend on the most sensitive beneficial use to be protected, and what level of protection is necessary for aquatic life and human health.

Additionally, as stated in Oregon's water quality standards at OAR 340-041-0033(3)(a):

Each value in Table 33A is effective on February 15, 2005, unless EPA has disapproved the value before that date. If a value is subsequently disapproved, any corresponding value in Table 20 becomes effective immediately...

Since EPA disapproved the criteria for some parameters in Table 33A, the previously approved criteria for these parameters in Table 20 are effective. The criteria in effect in Table 20 are listed below (see also Part III.B.3 for freshwater and saltwater aquatic life criteria currently in effect in Oregon).

Aldrin: (freshwater acute criterion and saltwater acute criteria)
Lindane: (freshwater chronic criterion, saltwater acute criterion)
Chlordane: (freshwater acute and chronic criteria, and saltwater acute and chronic criteria)
DDT 4,4: (freshwater acute and chronic criteria, and saltwater acute and chronic criteria)
Dieldrin: (saltwater acute and chronic criteria)
Endrin: (saltwater acute and chronic criteria)
Heptachlor: (freshwater acute and chronic criteria and saltwater acute and chronic criteria)
Endosulfan: (freshwater acute and chronic criteria and saltwater acute and chronic criteria)

B. EPA’s Action on the Addition of Freshwater Hardness-based Equations for Table 20

In the June 15, 2011 EQC water quality standards adoption, the acute and chronic hardness-based equations were added below Table 20. The underlined language indicates language that is new:

The freshwater criterion for this metal is expressed as a function of hardness (mg/L) in the water column. Criteria values for hardness may be calculated from the following formulas (CMC refers to Acute Criteria; CCC refers to Chronic Criteria):

$$CMC = (\exp(m_A * [\ln(\text{hardness})] + b_A)) * CF$$

$$CCC = (\exp(m_C * [\ln(\text{hardness})] + b_C)) * CF$$

<u>Chemical</u>	<u>m_A</u>	<u>b_A</u>	<u>m_C</u>	<u>b_C</u>
<u>Cadmium</u>	<u>1.128</u>	<u>-3.828</u>	<u>0.7852</u>	<u>-3.49</u>
<u>Chromium III</u>	<u>0.819</u>	<u>3.688</u>	<u>0.819</u>	<u>1.561</u>
<u>Copper</u>	<u>0.9422</u>	<u>-1.464</u>	<u>0.8545</u>	<u>-1.465</u>
<u>Lead</u>	<u>1.273</u>	<u>-1.46</u>	<u>1.273</u>	<u>-4.705</u>
<u>Nickel</u>	<u>0.846</u>	<u>3.312</u>	<u>0.846</u>	<u>1.1645</u>
<u>Silver</u>	<u>1.72</u>	<u>-6.52</u>		
<u>Zinc</u>	<u>0.8473</u>	<u>0.8604</u>	<u>0.8473</u>	<u>0.7614</u>

EPA Action

In accordance with its Clean Water Act authority, 33 U.S.C § 1313(c)(3) and 40 CFR § 131, EPA disapproves all of the new language identified above.

EPA Rationale

Prior to 2004, the introductory language to Table 20 referred the reader to *EPA’s Quality Criteria for Water 1986* (EPA 440/5-86-001, hereafter referred to as the Gold Book) for a “descriptions of each compound.” The Gold Book contained the equations for each of the pollutants referenced above and each criterion was expressed as the total recoverable metals concentration. None of the equations in the Gold Book contained a conversion factor (CF), which is used to convert total recoverable metals criteria to dissolved metals concentrations.¹⁷

The State’s 2011 revisions to the water quality standards inserted the equations found in the Gold Book but added a CF to both the acute and chronic criteria equations. The value of each CF was not identified in the revision. By adding the undefined CF, the State has revised the acute and chronic criterion equations that were in Table 20.

1. Freshwater Acute Cadmium Criterion and Freshwater Acute and Chronic Copper Criteria: In addition to the Table 20 revisions described above, the State adopted new criteria for acute cadmium and acute and chronic copper criteria in Table 33B. The criteria adopted in Table 33B are more stringent than the revised criteria in Table 20. EPA disapproved the revised acute cadmium criterion and the

¹⁷ The Gold Book contained EPA’s 304(a) recommendations from 1986. EPA has since revised its 304(a) recommended criteria several times to account for new information.

acute and chronic copper criterion contained in Table 33B because they were not protective of designated uses.¹⁸ EPA is relying on the same rationale for disapproving the less stringent revised acute cadmium and acute and chronic copper criteria in Table 20. For a detailed description of EPA's rationale see Part IV.B.4(c) and Part IV.B.4(d).

2. Freshwater Criteria for:

Cadmium:	chronic only
Chromium III:	acute and chronic
Lead:	acute and chronic
Nickel:	acute and chronic
Silver:	acute
Zinc:	acute and chronic

The State has revised the above referenced criteria in Table 20 by applying a CF to the equations for the acute and chronic criteria, as described above. The State also adopted new criteria for the above referenced criteria in Table 33B. The criteria adopted in Table 33B are more stringent than the revised criteria in Table 20. EPA approved the revisions to the criteria in Table 33B (see Part VI.B.3(a) above). As stated in OAR 340-041-0033(3)(a):

Each value in Table 20 is effective until the corresponding value in Tables 33A or 33B becomes effective...(B) Each value in Table 33B is effective upon EPA approval.

EPA has approved the revised criteria in Table 33B for the above referenced criteria, therefore, the revised criteria in Table 20 are no longer effective under State law. Nonetheless, EPA is disapproving the revision of the added language to Table 20 (described above) because the State has not provided any information on the value of the CF it is applying to each criterion, nor has it provided any information to show that the revised criteria are protective of the state's aquatic life designated use.

Remedies to Address EPA's Disapproval

The specific remedies for freshwater acute cadmium are discussed in the remedy section of Part IV.B.4(c). The specific remedies for acute and chronic copper are discussed in the remedy section of Part IV.B.4(d).

No specific remedies are necessary for the remainder of the criteria because the effective criteria for the criteria listed below are contained in Table 33B:

Cadmium:	chronic only
Chromium III:	acute and chronic
Lead:	acute and chronic
Nickel:	acute and chronic
Silver:	acute
Zinc:	acute and chronic

¹⁸ Though the State adopted values from EPA's 1986 CWA § 304(a) recommendations, as noted in the prior footnote, those values have been revised several times since then because of new information that demonstrates that the 1986 recommended values that Oregon adopted are not in fact protective.

Freshwater Aquatic Life Criteria Currently in Effect in Oregon

Cadmium:	Acute: $\exp(1.128[\ln(\text{hardness})]-3.8280)$ (as total recoverable)
Copper:	Acute: $\exp(0.9422[\ln(\text{hardness})]-1.464)$ (as total recoverable)
	Chronic: $\exp(0.8545[\ln(\text{hardness})]-1.465)$ (as total recoverable)

For the following parameters see Table 33B for the currently effective criteria in Oregon:

Cadmium:	chronic only
Chromium III:	acute and chronic
Lead:	acute and chronic
Nickel:	acute and chronic
Silver:	acute
Zinc:	acute and chronic

C. EPA's Action on Non-substantive Editorial or Formatting Changes in Table 20

The following non-substantive formatting changes were made to Table 20:

- Removed column which identified a pollutant as either a carcinogen or non –carcinogen.
- Removed the term “M.C.L. = Maximum Contaminant Level”.
- Removed the term: “** = human health criteria for carcinogens reported for three risk levels. Value presented is the 10^{-6} risk level, which means the probability of one concern case per million people at the stated concentration.”
- Removed the term: “f= fibers”
- Removed the terms: μg = micrograms; ng = nanograms; pg = pictograms, Y = Yes; N = No
- Removed the term: “Water and Fish Ingestion: Values represent the maximum ambient water-concentration for consumption of both contaminated water and fish or other aquatic organisms”
- Removed the term: “ Fish Ingestion: Values represent the maximum ambient water concentration for consumption of fish or other aquatic organisms”
- Removed the table which identified the Basins located within Oregon, and added Footnote 1 which states that “Values in Table 20 are applicable to all basins.”

EPA Action

EPA acknowledges the above referenced editorial changes made to Table 20 and approves these changes as non-substantive editorial changes.

The State has added the words “Aquatic Life” prior to the phrase “Water Quality Criteria Summary.” The heading to the table now reads “Aquatic Life Water Quality Summary.

The table that identified the basins within Oregon was removed, however, Footnote 1 was added and states that all criteria in Table 20 are applicable to all basins, therefore, this is an editorial change only.

All other changes were associated with the human health criteria that were part of Table 20 prior to the 2011 water quality standards revision. In the 2011 water quality standards revision, all human health criteria and the references associated with them were moved from Table 20 to a separate Table. Since

human health criteria are no longer a part of Table 20, it is reasonable to remove all references to human health criteria.

D. Guidance Values Moved from Table 20 to Table 33C

In its 2004 water quality standards revisions, the State moved all of the aquatic life guidance values in Table 20¹⁹ to a new Table 33C. EPA’s review of this action is contained in EPA’s *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* (June 1, 2010, pages 38 – 39). As stated in the June 2010 TSD “...the guidance values in Table 33C are not considered WQS under the CWA. Instead, the guidance values are one of several sources that can be used to interpret the narrative criterion at OAR 340-041-0033(1).²⁰ The guidance values in Table 33C are not adopted as criteria and, if used, the state would need to document why the number is appropriate for an individual action....” Therefore, EPA is not making a determination on the adequacy of the values in Table 33C to protect aquatic life.

¹⁹ In the table, the State distinguished these values from criteria using an asterisk that indicated “[i]nsufficient data to develop criteria).”

²⁰ OAR 340-041-0033(1) was re-numbered in the 2011 water quality standards revision and it is now identified as OAR 340-041-0033(2).