

**To:** DEQ Water Quality Staff

**From:** Water Quality Permitting and Program Development

**Date:** April 21<sup>st</sup> 2022

**Updated By:** Aliana Britson, *Water Quality Permitting and Program Development (4/21/2022)*

**Subject:** Implementation Instructions for Dissolved Metals Water Quality Criteria in Reasonable Potential Analysis and Water Quality-based Effluent Limits Calculations

This memorandum describes the procedure for determining whether a discharge has a reasonable potential to cause or contribute to an excursion above state water quality criteria for dissolved metals. Additionally, the memorandum provides information on the development of water quality-based effluent limits (WQBELs). There are separate memorandums for Arsenic, Chromium, and Selenium that address issues associated with speciation and implementation. Therefore, those metals are not addressed here. The term “total recoverable” indicates an unfiltered measurement, while “dissolved” indicates a filtered measurement.

**Applicable Water Quality Standards for Dissolved Metals**

Oregon water quality standards include numeric criteria for a variety of toxic metals to protect aquatic life (OAR 340-041-0033(3) Table 30). The following table summarizes effective aquatic life criteria in Oregon that are expressed in terms of “dissolved” concentrations in the water column. Many of the freshwater criteria are hardness dependent and must be calculated on a site-specific basis. The table excludes criteria that are addressed in other memos (Arsenic, Chromium, and Selenium) and metal criteria expressed as total recoverable (Aluminum).

**Summary of Water Quality Criteria Effective in Oregon Expressed as Dissolved Metals**

Chemical	Aquatic Life Criteria (Freshwater)		Aquatic Life Criteria (Saltwater)	
	Acute (µg/L)	Chronic (µg/L)	Acute (µg/L)	Chronic (µg/L)
<b>Cadmium</b>	Calculate *	Calculate <sup>F</sup>	40	8.8
<b>Copper</b>	Copper BLM	Copper BLM	4.8	3.1
<b>Lead</b>	Calculate <sup>F</sup>	Calculate <sup>F</sup>	210	8.1
<b>Nickel</b>	Calculate <sup>F</sup>	Calculate <sup>F</sup>	74	8.2
<b>Silver</b>	Calculate <sup>F</sup>	0.10	1.9	--
<b>Zinc</b>	Calculate <sup>F</sup>	Calculate <sup>F</sup>	90	81

\* Note: Although a freshwater acute cadmium criterion is shown on Table 30, it was disapproved by EPA and is therefore not effective for Clean Water Act purposes. A federally promulgated freshwater acute cadmium aquatic life criterion is effective in Oregon for Clean Water Act purposes as of March 6, 2017. The federally promulgated criterion is expressed as a function of hardness in the water column. To calculate the criterion, use the formula noted in [Final Rule – Aquatic Life Criteria for Cadmium in Oregon](#)

<sup>F</sup> The freshwater criterion for this metal is expressed as a function of hardness (mg/l) in the water column. To calculate the criterion, use formula under **Endnote F** at the end of **Table 30**.

--“ indicates no criterion

“Calculate” indicates that criterion is hardness dependent and must be calculated

“Copper BLM” indicates that the criteria is calculated using the Biotic Ligand Model referenced in endnote N at the bottom of **Table 30**.

## **Background Information**

In 2004, Oregon adopted the majority of the aquatic life toxics criteria for metals based on the dissolved fraction in water as recommended by EPA in a 1993 guidance memo<sup>1</sup> and based on EPA's latest recommended criteria as of 2002. The EPA determined that for most metals, the dissolved fraction of metal in water more closely approximates the bio-available or "toxic" fraction of metal in the water column than does the "total recoverable" fraction. While EPA initially approved many of Oregon's dissolved metals criteria on Jan. 31, 2013, it disapproved Oregon's freshwater copper criteria and the acute cadmium criterion. Oregon adopted revised copper aquatic life criteria on Nov. 2, 2016. On Jan. 9, 2017, EPA approved Oregon's revised copper criteria. Oregon did not adopt a revised acute cadmium criterion; therefore, EPA finalized the freshwater acute cadmium criterion in accordance with the Clean Water Act. The federally promulgated freshwater acute cadmium criterion was effective in Oregon beginning March 6, 2017. Both the revised cadmium and copper aquatic life criteria are applied as dissolved fractions in ambient waters.

Federal regulations<sup>2</sup> specify that in cases where a reasonable potential is indicated, a WQBEL expressed as total recoverable should be calculated and included in the permit. This requirement exists because chemical differences between the effluent discharge and the receiving waterbody can result in changes in the partitioning between dissolved and particulate forms of metal. Since partitioning factors for dissolved metals are not readily available, DEQ staff should follow the implementation instructions below for establishing reasonable potential for dissolved metals water quality criteria.

## **Implementation Instructions for NPDES Permits**

Determination of reasonable potential to exceed a water quality criteria should be done using the dissolved fraction of a metal when the criteria is specified in the dissolved fraction. Total recoverable metals may be used as a conservative surrogate to complete a reasonable potential analysis (RPA) if no dissolved concentration data is available at the time of permit renewal. Any determination of reasonable potential or WQBELs calculated using total recoverable data must be reviewed by the RPA subject matter expert and/or direct support. If a metal with a dissolved concentration criteria is identified as a pollutant of concern, monitoring for both total recoverable and dissolved results must be included in the renewed permit.

According to EPA regulations, WQBELs for the dissolved metals must be expressed in terms of "total recoverable". Accordingly, compliance monitoring will also be in terms of "total recoverable".

## **Conclusion**

Monitoring for total and dissolved concentrations are required in cases where monitoring for metals would be required. Total recoverable concentrations may be used as a conservative surrogate in cases where there are no analytical results for dissolved concentrations in order to complete the RPA.

---

<sup>1</sup> EPA. Martha G. Prothro. Memo: Office of Water Policy and Technical Guidance on Interpretation and Implementation of Aquatic Life Metals Criteria. October 1, 1993.

<sup>2</sup> 40 CFR 122.45(c)