

**To:** DEQ Water Quality Staff

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

**Date:** September 7<sup>th</sup>, 2021

**Updated By:** Aliana Britson, *Water Quality Permitting and Program Development (9/7/2021)*

**Subject:** Implementation Instructions for Inorganic Arsenic Water Quality Criteria(CAS #: 7440-38-2). Version 2.0

This memo clarifies how DEQ interprets arsenic concentrations in effluent and surface water to determine compliance with water quality criteria.

**Criteria Summary**

Oregon water quality standards include numeric criteria for arsenic to protect human health and aquatic life (OAR 340-041-0033, and Tables 30 and 40). Formerly, the arsenic criteria were in terms of total recoverable, but have since been updated to reflect the most toxic form of arsenic (inorganic arsenic). There are several fractions of arsenic that are relevant to this memo. The term “Arsenic” is used to mean all fractions of arsenic (i.e. both organic and inorganic fractions). The terms “total inorganic arsenic” and “Inorganic Arsenic” are often used interchangeably and refer to just the inorganic fractions of arsenic (i.e. arsenic (III) + arsenic (V)). Arsenic and Inorganic Arsenic can be measured in the “total recoverable” or “dissolved” fraction (i.e. having passed through a 0.45 µm filter).

The human health criteria (Table 40) are based on total recoverable inorganic arsenic, while the aquatic lifecriteria (Table 30) are based on dissolved inorganic arsenic. Table 1 below reflects the arsenic criteria as published in the rule in OAR 340-041-8033

**Table 1: Water Quality Criteria**

Pollutant	Table 40		Table 30			
	Human Health Criteria		Aquatic Life Criteria (Freshwater)		Aquatic Life Criteria (Saltwater)	
	Water + Org (µg/L)	Org Only (µg/L)	Acute (µg/L)	Chronic (µg/L)	Acute (µg/L)	Chronic (µg/L)
<b>Arsenic (Inorganic)</b>	2.1 <sup>A</sup>	2.1 <sup>A</sup> (fresh) 1.0 <sup>A</sup> (salt)				
<b>Arsenic</b>			340 <sup>C,D</sup>	150 <sup>C,D</sup>	69 <sup>C,D</sup>	36 <sup>C,D</sup>

<sup>A</sup> The arsenic criteria are expressed as total inorganic arsenic. The “organism only” freshwater criterion is based on a risk level of approximately 1 x 10<sup>-5</sup>, and the “water + organism” criterion is based on a risk level of 1 x 10<sup>-4</sup>.

<sup>C</sup> Criterion is expressed in terms of “dissolved” concentrations in the water column.

<sup>D</sup> Criterion is applied as total inorganic arsenic (i.e. arsenic (III) + arsenic (V)).

Table 2 interprets the criteria to explicitly state which fraction each criteria is in

**Table 2: Criteria Fraction**

Table 40		Table 30			
Human Health Criteria		Aquatic Life Criteria (Freshwater)		Aquatic Life Criteria (Saltwater)	
Water + Org (µg/L)	Org Only (µg/L)	Acute (µg/L)	Chronic (µg/L)	Acute (µg/L)	Chronic (µg/L)
Total Recoverable Inorganic Arsenic	Total Recoverable Inorganic Arsenic	Dissolved Inorganic Arsenic	Dissolved Inorganic Arsenic	Dissolved Inorganic Arsenic	Dissolved Inorganic Arsenic

**Key Issues**

Federal permit application requirements in 40 CFR 122.21 require select facilities to monitor for total recoverable arsenic as part of their NPDES permit application requirements using 40 CFR 136 approved methods. However, there are currently no state water quality criteria for total recoverable arsenic, only for inorganic arsenic.

Inorganic arsenic is not specified in 40 CFR 136 and thus there are no CFR approved methods for this analyte. Furthermore, analytical method 200.8 measures total recoverable arsenic, not inorganic arsenic. This leads to confusion from permittees as to what methods are needed to analyze inorganic arsenic.

**Recommended Analytical Method**

Table 3 contains the list of applicable pollutant species and recommended analytical methods. To determine the applicable quantitation limits (QL) for individual permit holders, please refer to the current recommended QL list on DEQ’s website [www.oregon.gov/deq](http://www.oregon.gov/deq)

**Table 3: Monitoring Guidance**

Pollutant	Criteria Type	Fraction	Recommended Analytical Method
<b>Arsenic</b>	N/A	Total Recoverable	200.8
<b>Arsenic</b>	Human Health	Total Recoverable Inorganic	1632A
<b>Arsenic</b>	Aquatic Toxicity	Dissolved Inorganic	1632A + 0.45 µm filtration

**Implementation Instructions for NPDES Permits**

If no inorganic arsenic data are available at time of permit renewal, total recoverable arsenic may be used as a conservative surrogate to complete analysis. Any WQBELs calculated using total recoverable arsenic must be reviewed by the RPA subject matter expert and/or Direct Support. Monitoring for both total recoverable inorganic and dissolved inorganic fractions must be included in the renewed permit if arsenic is considered a pollutant of concern.

## **Conclusion**

Permittees must monitor for inorganic arsenic (both total recoverable inorganic and dissolved inorganic fractions) when arsenic monitoring is required. If no inorganic arsenic results are available at time of permit renewal, total recoverable arsenic may be used as a conservative surrogate for RPA calculations but any WQBELs must be reviewed by the RPA subject matter expert and/or Direct Support.