

First Notice of Rulemaking: Aquatic Life Methodology

1. The proposed rulemaking is to update the methodologies used to calculate aquatic life criteria for substances that do not have criteria adopted into rule for waters outside of the Great Lake System (Downstate). These methodologies are used to evaluate whether NPDES permit limitations are warranted, and if so, for limiting discharges of these substances in permits.
2. IDEM currently utilizes two different methodologies for calculating aquatic life criteria for chemicals that do not have criteria adopted into rule.
3. Downstate aquatic life methodologies were adopted during the 1990 rulemaking, and do not conform to U.S. EPA's 1985 national methodology, which is used to calculate National Recommended Water Quality Criteria at Section 304(a) of the Clean Water Act.
 - a. The Downstate methodology is a downsized version of the U.S. EPA 1985 national methodology. The Downstate methodology only requires toxicity data from five families and one acute-to-chronic ratio for a chronic criterion.
 - b. U.S. EPA's 1985 national methodology requires toxicity data for eight families and three acute-to-chronic ratios for a chronic criterion.
 - c. The Downstate methodology does not require toxicity data from many of the families of organisms that U.S. EPA considers sensitive to toxic pollutants. Using only a single acute-to-chronic ratio for determining the chronic criterion is questionable since this does not capture any variability. An additional inconsistency occurs if acute-to-chronic ratio toxicity data is not available: the Downstate methodology calculates the final chronic value by dividing the Final Acute Value (FAV) by 45, while the Great Lakes System methodology divides the FAV by 18.
 - d. Both the Downstate and Great Lakes System methodologies include procedures for calculating criteria when toxicity data for the required number of families is not available.
4. In 1997, Indiana adopted the Great Lakes Water Quality Initiative Guidance which contained U.S. EPA's 1985 national methodology and a new Tier II methodology. The Tier II methodology is applied when toxicity data from eight families and three acute-to-chronic ratios are not available for a chemical.
 - a. ORSANCO Pollution Control Standards use Great Lakes Water Quality Initiative Guidance methodologies for development of aquatic life criteria and values, which are the methodologies in our Great Lakes System rule.
5. If toxicity data is available for eight families and three acute-to-chronic ratios, the Downstate and Great Lakes System methodologies will calculate the same acute and chronic criteria. If not, the derived criteria can be more

or less stringent using the same toxicity data. This creates inconsistency across the state when the criteria are used for NPDES permitting. See examples for criteria calculated using both methodologies using the same toxicity data in Table 1.

6. IDEM has used these methodologies to calculate acute and/or chronic aquatic life criteria for many chemicals that do not have criteria in rule. Currently, IDEM has used the methodologies in rule to calculate criteria for:
 - a. 24 chemicals Downstate
 - b. 11 chemicals Great Lakes System-Tier I
 - c. 75 chemicals Great Lakes System-Tier II
7. To ensure consistency in permitting for chemicals not adopted into rule across the state, including for discharges to the Ohio River, updating the Downstate aquatic life methodology is a high priority for OWQ NPDES permitting.

Note: for a substance, using the GL methodologies, the acute and/or chronic numbers may calculate to be either **more stringent** or **less stringent** than the numbers calculated using the Downstate methodologies.

Table 1. Comparison of aquatic life criteria calculated using the methodologies in rule for waters outside ("Downstate") and within the Great Lakes System

Chemical	Downstate AAC (µg/L)	Downstate CAC (µg/L)	Great Lakes Tier I CMC (µg/L)	Great Lakes Tier I CCC (µg/L)	Great Lakes Tier II Acute Value (µg/L)	Great Lakes Tier II Chronic Value (µg/L)
Acetaldehyde	1,500	68			1,200	130
Anthracene	0.23	0.01			6.1	0.68
Antimony	720	210			720	80
Beryllium ¹	60	2.7			120	6.7
Boron	41,000	7,700	41,000	7,700		
cis-1,2-Dichloroethylene	7,200	320			5,500	620
trans-1,2-Dichloroethylene	18,000	800			5,000	560
Molybdenum	84,000	3,800			7,200	800

Thallium	86	35			47	13
Tetrachloroethylene	1,400	210			480	60
1,1,1-Trichloroethane	1,100	50			3,700	410
Trichlorethylene	2,200	100			2,300	260
Vinyl chloride	11,000	480			8,400	930

AAC Acute Aquatic Criterion (Downstate)

CAC Chronic Aquatic Criterion (Downstate)

CMC Criterion Maximum Concentration (Great Lakes - acute)

CCC Criterion Continuous Concentration (Great Lakes -chronic)

¹ Hardness-based, value calculated at 100 mg/L of hardness as CaCO₃

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Note: IDEM has prepared a fact sheet, available for public review for each derived criteria, that documents the aquatic species toxicity endpoints, reference studies, and methodologies used for the calculation.