

Methylmercury Human Health Criteria

In January 2001, EPA published a new water quality criterion of 0.3 mg/kg expressed as a concentration in edible fish tissue. In order to establish TPDES permit limits, this fish tissue criterion needs to be translated to water column criteria (water + fish as well as fish only). Three methodologies to perform this conversion are presented in EPA's *Draft Guidance for Implementing the January 2001 Methylmercury Water Quality Criterion* (EPA-823-B-04-001):

- use site-specific methylmercury BAFs derived from field studies,
- use a scientifically defensible bioaccumulation model (ex: USGS's National Descriptive Model of Mercury and Fish Tissue (Wente 2004)), or
- use the national BAFs presented in the 2001 criterion document.

WQA Staff recommend that an equation for the translation of the tissue-based criterion to a water column based criterion be listed in Table 3 of the TSWQS as opposed to the tissue-based criterion itself. The equation to translate the tissue-based criterion to a water + fish consumption criterion is as follows:

$$AWQC = TRC \div BAF$$

Where:

AWQC = Water concentration-based ambient water quality criterion in mg/L

TRC = Tissue concentration-based ambient water quality criterion of 0.3 mg/kg

BAF = Bioaccumulation factor for trophic levels 2, 3, and 4 weighted on the basis of consumption rates for each trophic level in L/kg

Options Under Evaluation for TCEQ WQS Revisions

Option 1: Since there is no site-specific methylmercury BAF for the state of Texas, the national BAFs listed in the 2001 criteria document seem to be the next logical choice. However, Appendix A of the criteria document goes on to point out many uncertainties with these BAFs, especially with relation to uncertainty arising from natural variability and measurement error. The BAFs are as follows:

$$\text{Trophic Level 2} = 1.2 \times 10^5 \text{ L/kg}$$

$$\text{Trophic Level 3} = 6.8 \times 10^5 \text{ L/kg}$$

$$\text{Trophic Level 4} = 2.7 \times 10^6 \text{ L/kg}$$

In order to get a weighted BAF, the fraction of total fish consumption provided by EPA is multiplied by each trophic level BAF:

$$\text{Trophic Level 2} = 0.06048 * 1.2 \times 10^5 = 7,257.6 \text{ L/kg}$$

$$\text{Trophic Level 3} = 0.64754 * 6.8 \times 10^5 = 440,327.2 \text{ L/kg}$$

$$\text{Trophic Level 4} = 0.29198 * 2.7 \times 10^6 = 788,346.0 \text{ L/kg}$$

The total of the weighted BAFs yield a final BAF of 1.2×10^6 which yields a water + fish criterion of 2.4×10^{-4} ug/L. The current water + fish criterion is 1.2×10^{-2} ug/L.

Option 2: The 2001 methylmercury criteria document does recommend a draft BCF of 3.3×10^4 . This BCF could be used in place of the BAF until a more accurate BAF can be determined. If a permittee decided to seek a variance to perform a site-specific study for methylmercury, that permittee would be required to determine a site-specific BAF for the criterion translation. Under this scenario, the water + fish human health criterion would equal 8.7×10^{-3} ug/L.