November 22, 2021

Ms. Paula Wilson
Idaho Department of Environmental Quality
1410 North Hilton
Boise, ID 83706

Dear Ms. Wilson:

The Idaho Association of Commerce and Industry (IACI) is the leading trade association of Idaho businesses and represents hundreds of employer members of all sizes engaged in diverse commercial and industrial enterprises through the state. The Department of Environmental Quality (Department) is going through a multi-year negotiated rulemaking process to establish new human health water quality criteria for arsenic (As). The arsenic water quality criteria values are used to set cleanup/remedial action objectives, total maximum daily loads (TMDLs), requirements for Idaho Pollution Discharge Elimination System (IPDES) permits, and protect designated beneficial uses. Thus, these criteria are very important to the regulated community and are of direct interest to, and have direct impact on, the IACI membership.

IACI participated in the November 4, 2021 negotiated rulemaking and has the following comments on the negotiated rule draft number three (3) (DRAFT No. 3).

Domestic Water Supply Designated Use (Water and Fish Criteria)

Comment No. 1: The footnote referencing the Safe Drinking Water Act Maximum Contaminant Level (MCL) should be kept. As discussed in the rulemaking meetings, for arsenic it is logical and practical for the water supply (ingestion or water column) criterion value be the same as the MCL value given they are both designed to protect human health. Referencing the MCL as the source of the criterion provides the basis of the value.

Recreation Designated Use (Fish Only)

Comment No. 2: IACI supports the fish tissue "element" superseding the water column "element" of 4.3 micrograms per liter (μg/L) as this water column criterion element is a conservative value based on conservative assumptions. As discussed in our September 22, 2021 comments, the 4.3 μg/L concentration was derived by calculating the geometric mean of the bioaccumulation factor (BAF) calculated for each of the paired water quality/fish tissue concentrations by tropic level and then deriving trophic level weighted BAF. The geometric mean is purely a mathematical calculation; the calculation assumes a direct relationship exists between the inorganic arsenic concentration in fish tissue and in the water column. Based on the monitoring data (as

well as data from other studies reported in the literature) we know that is not the case. Moreover, calculating a geometric mean does not test whether a direct relationship between water and tissue is actually present or whether the calculated BAF based on the geometric mean is a good predictor of measured concentrations.

The regression analysis methodology used to derive the BAF of 0.61 L/kg presented in IACI's earlier comments[1] does not assume *a priori* that a direct relationship exists between inorganic arsenic in the water column and fish tissue. Instead, it is a methodology that identifies the best relationship, determines whether the relationship is statistically significant, and how much of the observed range of inorganic arsenic in fish tissue concentrations can be explained by the inorganic arsenic concentration in surface water. In this case, consistent with previous findings reported in the literature, the regression analysis identified a weak, not statistically significant relationship, with the concentration in water explaining relatively little of the range of concentrations observed in fish tissue. However, given one of the outputs of the regression methodology is the best available relationship, that relationship does indeed provide the best mathematical representation of the relationship between fish tissue and water column concentrations.

The relative ability of the geometric mean-based BAF and the regression-based BAF to predict measured inorganic arsenic tissue concentrations can be compared using a statistical test. The relative performance of the two alternative BAFs was analyzed using the Aikake Information Criterion (AICc) statistic, an estimation of prediction error. Details of the statistical and its results are presented in Attachment A. The findings of the statistical comparison of the relative predictive ability of the two BAFs provide clear evidence that the regression-based BAF is better supported by the data than the geometric mean-based BAF.

Based on the clear demonstration that the regression-based BAF is a better predictor of tissue concentrations than the geometric mean-based BAF, IACI continues to recommend that the fish consumption only water quality criterion be based on the scientifically more defensible regression-based BAF of 0.61 L/kg presented in IACI's previous comments resulting in a water column criterion of 13 μg/L.[2] This statistical comparison demonstrates that the 4.3 μg/L is a "conservative value" and it is appropriate that the fish tissue criterion of 8.0 micrograms per kilogram (μg/kg) be the primary standard.[3] This approach is consistent with the U.S. EPA and the Department's implementation of the selenium criterion elements for water.

[1] See IACI's September 22, 2021 comment letter for the details on the use of the regression analysis method and associated calculations.

[2] See IACI's September 22, 2021 comment letter.

[3] The 8.0 μg/kg is based upon the standard equation for calculating a human health criterion which utilizes a fish consumption rate, mean adult body weight, and a cancer risk factor.

Comment No. 3. Footnote "l" should be modified to state that the if the water column concentration is equal to or less than 4.3 μg/L, then the fish only criterion is met.

Applicability/Application of Toxics Criteria

Comment No. 4: Footnote "e.v" should be changed to reflect that gamefish may not be able to be captured for purposes of demonstrating achievement of the criteria. IACI recommends the following language be used in the footnote:

> v. Fish tissue sample(s) should be representative of gamefish species present at the site, unless after reasonable effort collection of such species is impractical. Then, other species can be collected to demonstrate compliance with the criterion.

We appreciate the opportunity to present these comments.

Sincerely,

Alex LaBeau
President

cc: Alan Prouty, Chair
IACI Environment Committee

Attachment

Attachment A. Statistical comparison of the relative predictive ability of the geometric-based and regression-based BAFs.

The relative performance of the two alternative BAFs were analyzed using the Aikake Information Criterion (AICc) statistic, an estimation of prediction error. This method is based on the model's goodness of fit or how much the model deviates from the existing data (Wagenmakers and Farrell 2004). The BAFs were tested by fitting linear models of the collocated inorganic fish tissue and surface water data while coercing the slopes of the resulting models to be equal to the prescribed BAF. For both models, the y-intercepts were set equal to zero. The AICc values for the resulting models were used to calculate the relative likelihood or probability that each model model best represents the data and allows the models to be ranked based on that relative probability (Burnham et al. 2011).

The models analyzed represented the trophic-level weighted geometric mean-based BAF of 1.87 L/kg and the trophic-level weighted regression-based BAF of 0.61 L/kg. As noted above the slope of each model was set to be equal to the given BAFs. Results provide the relative probability that the models best represent the data. Models with higher relative probabilities better represent the data from which they were developed. The relative probability of the regression-based BAF was approximately 1.0 and the relative probability of the geometric mean-based BAF was approximately 0.0 (Table 1). These results provide clear evidence that the regression-based BAF has a higher relative probability and is therefore better supported by the data than the geometric mean-based BAF.

All analyses were performed using Program R (R Core Team 2021).

Table 1

Model	AICc	Log Likelihood	Probability
Regression-based BAF	231.33	-144.62	0.9999984
Geomean-based BAF	258.06	-127.99	0.0000016

References

Burnham, K.P., Anderson, D.R. and Huyvaert, K.P., 2011. AIC model selection and multimodel inference in behavioral ecology: some background, observations, and comparisons. Behavioral Ecology and Sociobiology, 65(1), pp.23-35.

R Core Team. 2021. R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. URL https://www.R-project.org/.

Wagenmakers, E.J. and Farrell, S., 2004. AIC model selection using Akaike weights. Psychonomic Bulletin & Review, 11(1), pp.192-196.