

Ms. Paula Wilson
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Date: July 19, 2021
Our Ref: 30039729
Subject: Response to EPA Comments on Idaho's Arsenic Negotiated Rulemaking Meeting on June 23, 2021 – Docket No. 58-0102-1801

Dear Ms. Wilson,

I was reviewing the comments submitted to the Idaho Department of Environmental Quality (IDEQ or the Department) in response to the 23 June 2021 Arsenic Water Quality Rulemaking Meeting (Rulemaking Meeting) and saw my name mentioned in comments from the United States Environmental Protection Agency (USEPA)¹. I am sending this letter to provide additional context and clarification to the portion of USEPA's comment that refers to what I said at the Rulemaking Meeting regarding derivation of a bioaccumulation factor (BAF) for inorganic arsenic (iAs). The key clarification being that I believe the data collected by the Department indicate the concentration of iAs in fish tissue is independent of the concentration of iAs in surface water and, thus, do not support using USEPA's traditional BAF methodology to establish a water column-based water quality criterion (WQC) for iAs.

I will start by saying that USEPA has not mis-represented my suggestion that trophic level-weighted (TL-weighted) BAFs are a method that could be used to derive a BAF and is, in fact, the method used by USEPA (and IDEQ) to derive BAFs when setting human health WQC for most compounds. However, USEPA's comment does not include that my referring to TL-weighted BAFs occurred as part of what I would refer to as a "brainstorming session" during the Rulemaking Meeting. During that portion of the Rulemaking Meeting attendees discussed various methods that could be used to derive BAFs for iAs. Several other methods were also identified, some of which are described in USEPA's letter. The "brainstorming session" about the derivation of BAFs came after I had made the point that the Idaho-specific data collected by the Department indicate that no statistically significant overall relationship exists between the concentration of iAs in fish tissue and the concentration of iAs in the water column. Consequently, the concept of a BAF for iAs in Idaho surface waters is moot; the data indicate that changing the iAs concentration in the water column will not change the iAs concentration in fish tissue in any predictable way.

USEPA's letter uses the geometric mean of the paired tissue and water samples to develop TL-specific BAFs. Other approaches are also available. In fact, when I brought up the concept of a TL-weighted BAF, I was not thinking that such a TL-weighted BAF would be based on the geometric mean BAFs of paired samples. As

¹ Letter from Lisa Machio to Jason Pappani. Re: EPA Comments on Idaho's Arsenic Negotiated Rulemaking Meeting on June 23, 2021 – Docket No. 58-0102-1801. July 14, 2021.

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explained in the Arcadis April 2018 technical memorandum (Arcadis 2018)², estimating BAFs based on paired samples may not reflect the overall relationship between fish tissue and the water column. A better and more rigorous method is plotting paired fish tissue and surface water data across a range of water concentrations and then conducting regression analysis to understand the nature of any relationship between fish tissue and water column concentrations and determine whether the relationship is statistically significant. The relationship using all of the data collected by IDEQ in 2018 is not statistically significant (Arcadis 2021³, IDEQ 2021⁴). However, the slope of the regression can be used to establish a BAF of 0.18 liters per kilogram (L/kg) (Arcadis 2021, IDEQ 2021). That BAF is substantially lower than a BAF of between 1 and 2 referred to in USEPA's letter and is derived based on more robust methodology than using the geometric mean of all paired sample BAFs.

IDEQ also presents TL-specific regressions (IDEQ 2021). Those are similar to the feeding guild-specific regressions presented in Arcadis (2021). IDEQ did not indicate whether any of the TL-specific regressions were statistically significant, though the TL3 and TL4 regressions explained only about 2% and 9% of the variation in tissue concentration, respectively (IDEQ 2021). The TL2 regression explained 100% of the variation but also consisted of only two points (IDEQ 2021), so explaining 100% of the variation was a foregone conclusion. When species are sorted by feeding guild, insectivore and piscivore regressions were statistically significant but explained only 14% and 9% of the variation in fish tissue, respectively (Arcadis 2021). The insectivore regression was not statistically significant, perhaps because of a small sample size, but explained about 50% of the variation in fish tissue concentration (Arcadis 2021). Using the results of the regressions described above combined with USEPA's national apportionment of fish consumption rates between trophic levels, a TL-weighted BAF of 0.86 L/kg and a feeding guild-weighted BAF of 0.49 L/kg can be derived. Both of these BAFs are smaller than the range of 1-2 L/kg referred to by USEPA in their comment letter and are based on a more robust methodology (i.e., regression analysis) than using the geometric mean of individual paired tissue and water samples.

In closing, I would like to reiterate what I view as the most important observation arising from the Idaho-specific data collected by the Department: the concentration of iAs in fish tissue is independent of iAs in the water column. As a result, iAs does not fit the traditional methodology used by USEPA and IDEQ to establish human health WQC for most compounds. That means that the concentration of iAs in the water column cannot be used to confirm that the beneficial use of fish consumption is being attained. Given currently available information, the best way to protect that beneficial use is monitoring of fish directly. The good news is that the Department's comprehensive statewide monitoring found that virtually all fish tissue samples have iAs concentrations well below the allowable tissue concentration of 8 micrograms per kilogram, meaning, at least with respect to iAs, fish in Idaho are safe to eat.

² Idaho Arsenic Human Health Criteria: Comments Prepared in Response to the 19 April 2018 Rulemaking Meeting. Prepared for J.R. Simplot Company. April 2018.

³ Further Evaluation of IDEQ 2019 Paired Fish and Surface Water Arsenic Data. Rulemaking Meeting presentation by Paul Anderson and Emily Morrison. April 21, 2021.

⁴ Revision of Idaho's Human Health Criteria for Arsenic. Docket No. 58-0102-1801. Rulemaking Meeting presentation by Jason Pappani. June 23, 2021.

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Thank-you in advance for accepting these comments even though they are being submitted after the requested deadline; however, the need to prepare and submit them was not apparent to me until after reading USEPA's comments.

Sincerely,
Arcadis U.S., Inc.

A handwritten signature in black ink, appearing to read "Paul Anderson", with a long horizontal flourish extending to the right.

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