Rulemaking Docket 58-0102-1801, Arsenic Human Health Criteria

Discussion Paper #3

Background

In 2016, as part of a consent decree negotiated with Northwest Environmental Advocates, EPA reviewed and disapproved Idaho's arsenic criteria from 2010. Under the consent decree, EPA has until November 2023 to either approve a DEQ submitted criterion or to promulgate a federal criterion in Idaho for arsenic. In response, Idaho initiated this rulemaking to update the human health criteria (HHC) for arsenic in 2018.

Idaho Water Quality Standards (WQS; IDAPA 58.01.02) provide numeric toxics criteria for the protection of human health for two exposure scenarios – exposure through fish consumption only, and exposure through fish plus drinking water consumption. The former is applied to waters designated for recreation uses, the latter are applied to waters designated as domestic water supply (DWS).

In this rulemaking, DEQ aims to adopt HHC for inorganic arsenic under Idaho's administrative procedures and prevent federal promulgation of criteria for Idaho.

Human Health Criteria Calculation

HHC are set to protect humans from exposures through both recreational uses, such as swimming, boating, or fishing, as well as DWS use, which is intended to protect public drinking water supply source waters. Although all Idaho waters are expected to meet recreation uses, only certain water bodies identified in rule are designated for DWS.

Human health water quality criteria are typically calculated using Equation 1.

$$\mathbf{AWQC = RSD * \left(\frac{BW}{DI+(FI*BAF)}\right) * 1000\ \mu g/mg}$$

Equation 1. General human health criteria equation.[1]

Where:

AWQC = ambient water quality criterion;
RSD = risk-specific dose (mg/kg-day) derived from a cancer slope factor (chemical specific value) and a target incremental cancer risk;
BW = human body weight (kg);
DI = drinking water intake (L/day);
FI = fish intake (kg/day);
BAF = bioaccumulation factor (L/kg); and
1000 µg/kg mg is a conversion factor to convert criteria in units of µg/L

Fish Only Exposure Equation

The HHC calculation outlined in Equation 1 accounts for exposure to toxins through both drinking water and consumption of fish tissue. However, to calculate criteria to protect recreational uses, only fish consumption exposures are used. Therefore, Equation 1 can be revised to calculate a Fish Only exposure by removing the DI term (Equation 2).

$$\mathbf{AWQC_{FO} = RSD * \left(\frac{BW}{(FI*BAF)}\right) * 1000\ \mu g/mg}$$

Equation 2. Equation for calculating Fish Only criterion.

Where:

$AWQC_{FO}$ = ambient water quality criterion, fish only exposure;
RSD = risk-specific dose (mg/kg-day) derived from a cancer slope factor (chemical specific value) and a target incremental cancer risk;
BW = human body weight (kg);
FI = fish intake (kg/day);
BAF = bioaccumulation factor (L/kg); and
1000 µg/kg mg is a conversion factor to convert criteria in units of µg/L

Bioaccumulation Factor (BAF)

Bioaccumulation "is a process in which a chemical substance is absorbed in an organism by all routes of exposure as occurs in the natural environment, i.e., dietary and ambient environmental sources" (Arnot and Gobas 2006). A bioaccumulation factor is the ratio of concentration of a pollutant in the tissue of fish to the concentration in the water.

[1] For more information on how these equations were derived and used to develop criteria, see the EPA *Methodology for Deriving Ambient Water Quality Criteria for the Protection of Human Health* (EPA 2000).

Field-based BAF data for chemicals are derived by collecting paired tissue and water column data in the field and are generally preferred for calculating HHC. BAF values include both dietary contributions as well as direct uptake from the environment (such as diffusion across the gill surface). Therefore, both EPA and DEQ prefer field-based BAFs over other estimates of bioaccumulation when determining HHC.

One way to reduce the variability associated with BAF values is to calculate the values by trophic level (TL). More specifically, calculation by TL helps to account for broad physiological differences, such as lipid content or life stage, among organisms that may influence bioaccumulation (EPA 2003).

Idaho WQS specify that DEQ will use a TL-weighted BAF or BCF to derive HHC (IDAPA 58.01.02.210.05.b.ii).

Fish Tissue Criterion Calculation

In Idaho's water quality standards, Fish Only criteria are intended to protect consumers of fish from increased cancer risk due to exposure to toxic pollutants that may be found in fish tissue. These criteria are used to protect recreational uses.

The Fish Only exposure equation presented in Equation 2 produces a value for the water column concentration. However, Equation 2 can be transformed to provide a fish tissue concentration by removing the BAF term. This fish tissue criterion value is a direct measure of the concentration of inorganic arsenic in fish tissue that would provide protection for consumers at the Idaho specific fish consumption rate and cancer risk factor. This is the tissue concentration that the water column concentration derived in Equation 2 will protect (Equation 3).

$$\mathbf{AWQC_{tissue}} = \mathbf{RSD} \times \left(\frac{\mathbf{BW}}{(\mathbf{FI})}\right) * \mathbf{1000}\ \mu\mathbf{g/mg}$$

Equation 3. Fish tissue criterion equation.

Where:

$\mathrm{AWQC_{tissue}}$ is the fish tissue criterion for inorganic arsenic in muscle, or fillet, tissue on a wet weight basis;
RSD is the risk-specific dose based on a target incremental cancer risk of 1 x 10^{-5} and a cancer slope factor for inorganic arsenic of 1.5 $(mg/kg\text{-}day)^{-1}$;
BW is the mean adult body weight of 80 kg;
FI is the fish consumption rate of 0.0665 kg/day; and
1000 µg/kg mg is a conversion factor to convert criteria in units of µg/kg

Idaho Arsenic Accumulation in Fish Tissue Study

DEQ initiated a monitoring project to determine appropriate BAFs for calculating the arsenic HHC. Previous efforts in Idaho were unable to provide detectable and quantifiable concentrations of inorganic arsenic in fish tissue (DEQ 2010). The goal of the project was to collect sufficient, quantified inorganic arsenic data from paired fish tissue and water in order to calculate BAFs.

BAFs were calculated from the Idaho arsenic accumulation in fish tissue study (DEQ 2020).

For purposes of fish tissue analysis, a sample was a composite of all fish tissue from a species at each site. For example, if five Rainbow Trout and five Mountain Whitefish were collected at a site, that site would have two samples.

Fish tissue and water were analyzed for total inorganic arsenic.

For each fish tissue sample, inorganic arsenic BAF was calculated using Equation 4.

$$\mathbf{BAF_{iAs}} = \left(\frac{\mathbf{[iAs]_{Fish}}}{\mathbf{[iAs]_{Water}}}\right)$$

Equation 4. Equation for calculating a bioaccumulation factor (BAF).

Where:

$\mathrm{BAF_{iAs}}$ is the sample BAF for inorganic Arsenic in L/kg;
$\mathrm{[iAs]_{Fish}}$ is the concentration of inorganic Arsenic in fish in µg/kg; and
$\mathrm{[iAs]_{Water}}$ is the concentration of inorganic Arsenic in water, in µg/L

Idaho's study indicates the concentration of inorganic arsenic in the water column was not significantly related to the concentration of inorganic arsenic in fish tissue and has been previously discussed. However, most measures of the central tendency of BAF from paired tissue and water samples throughout Idaho were in the 1 to 2 L/kg range (DEQ 2020).

The geometric mean of all individual BAFs was 1.12 L/kg.

Trophic Level (TL) Weighted BAF

The TL concept can be used to describe an organism's position on the food web (Figure 1). Fish can be assigned to a TL so that a TL weighted BAF can be calculated.

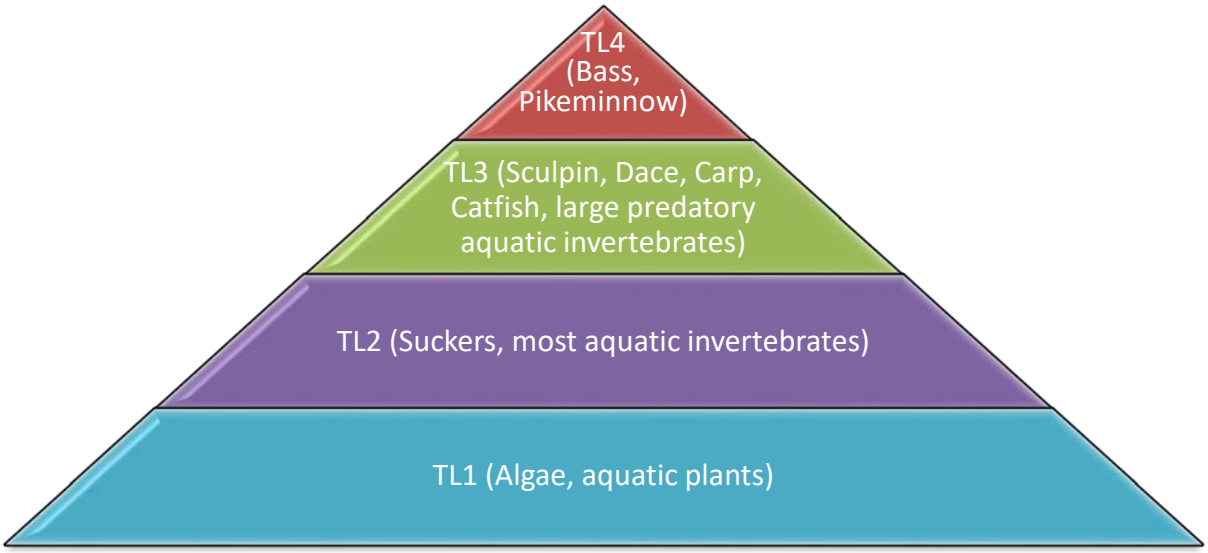

Figure 1. Illustration of the trophic level concept (from Alexander, 1999).

TL2 fish are those fish that mostly consume TL1 organisms (primary producers such as algae, aquatic plants, etc.). TL3 fish are those fish that primarily consume TL2 organisms (such as aquatic invertebrates, TL2 fish, etc.). TL4 fish are predatory fish that primarily consume TL3 organisms (large aquatic invertebrates, other fishes).

For purposes of calculating a trophic-level weighted BAF, TL assignments were made based on a synthesis of information found in Simpson and Wallace (1982), Wallace and Zaroban (2013), Sigler and Zaroban (2018), and FishBase (*https://www.fishbase.se/home.htm*). A geometric mean was calculated from individual sample BAFs by TL (Table 1).

Table 1. Trophic level assignments for calculation of a trophic level weighted bioaccumulation factor, and the geometric mean of calculated bioaccumulation factors (BAFs) by trophic level.

Trophic Level	Species	Rationale	Bioaccumulation Factor (L/kg)
2	Bridgelip Sucker	Herbivorous	2.99
3	Brook Trout, Channel Catfish, Common Carp, Cutthroat Trout, Longnose Dace, Mottled Sculpin, Mountain Whitefish, Rainbow Trout, Redside Shiner	Primarily invertivores, or opportunistic invertivore/piscivore where invertebrates make up a large component of diet	1.82
4	Brown Trout, Largemouth Bass, Northern Pikeminnow, Smallmouth Bass	Primarily piscivores, or diet composed mostly of large invertebrates and fishes	0.27

Although available, Idaho fish consumption surveys do not specify consumption rates by species or by TL. It is possible to calculate a TL weighted BAF by using the proportions of TL-specific consumption rates from EPA's national fish consumption rate and applying those proportions to Idaho's fish consumption rate.

TL-specific consumption rates were based on the proportion of the 90th percentile of TL-specific consumption of freshwater + estuarine fishes to the total consumption rate from the national estimated fish consumption study as presented in Table 2 (EPA 2014; see page 6 of EPA 2015 *Update of Human Health Ambient Water Quality Criteria: Benzene 71-43-2* [*https://downloads.regulations.gov/EPA-HQ-OW-2014-0135-0165/content.pdf*] for an example).

Table 2. Trophic level-specific consumption rates from the national fish consumption study.

Trophic Level	National Consumption rate, g/d	Proportion
2	7.6	0.36
3	8.6	0.40
4	5.1	0.24
Total	21.3	1.0

Source: EPA 2014. *Estimated Fish Consumption Rates for the U.S. Population and Selected Subpopulations.*

A TL weighted BAF was calculated using Equation 5.

$$\mathbf{TL\ BAF} = [(\mathbf{BAF_{TL2}})(\mathbf{P_{TL2}}) + (\mathbf{BAF_{TL3}})(\mathbf{P_{TL3}}) + (\mathbf{BAF_{TL4}})(\mathbf{P_{TL4}})]$$

Equation 5. Equation for calculating a trophic level weighted bioaccumulation factor using TL-specific proportions from the national fish consumption rate.

Where:

$TL\ BAF$ is the trophic level weighted BAF;

BAF_{TLi} is the geometric mean of BAFs calculated for all samples for species assigned to TLi; and

P_{TLi} is the proportion of national fish consumption rate for TLi fishes;

Substituting the TL-specific geometric mean BAFs from the Idaho probabilistic fish accumulation study (Table 1) and the TL-specific consumption proportions from the national fish consumption study (Table 2) yields a TL weighted BAF for inorganic arsenic of 1.87 (Equation 6).

$$\mathbf{TL\ BAF} = [(\mathbf{2.99\ L/kg})(\mathbf{0.36}) + (\mathbf{1.82\ L/kg})(\mathbf{0.40}) + (\mathbf{0.27\ L/kg})(\mathbf{0.24})] = \mathbf{1.87\ L/kg}$$

Equation 6. Trophic level weighted bioaccumulation factor.

Idaho Criteria Calculation

The following inputs were used to calculate Idaho HHC for inorganic arsenic (Table 3).

Table 3. Inputs used to derive HHC for Arsenic.

Exposure factors	
Target Incremental Cancer Risk	1×10^{-5}
Body Weight (BW)	80 kg
Fish Intake	0.0665 kg/day
Chemical specific factors	
Arsenic Cancer Slope Factor	1.5 $(mg/kg\text{-}day)^{-1}$
TL-Weighted BAF	1.87

Substituting these inputs for the variables described in the equations above yields the following calculated concentrations (Table 4).

Table 4. Calculated values based on Idaho specific inputs.

Exposure	Equation	Value
Fish Only, water column	Equation 2	4.3 µg/L
Fish Only, fish tissue	Equation 3	8.0 µg/kg

Draft Rule

Below are rule text, description, and discussion for Idaho's draft rule, by rule subsection.

Subsection 210.01

The following revisions are being proposed for the table headings for 210.01:

01. Criteria for Toxic Substances. The criteria of Section 210 apply to surface waters of the state as provided in Tables 1 and 2. Criteria for metals (arsenic through zinc) listed in Tables 1 and 2 are expressed as a dissolved fraction (i.e. passes through a 0.45 micron filter) unless otherwise noted.

a. Table 1 contains criteria ~~set for~~ to protect~~ion of~~ aquatic life. ~~Criteria for metals (arsenic through zinc) are expressed as dissolved fraction unless otherwise noted. For purposes of these criteria, dissolved fraction means that which passes through a forty five hundredths (0.45) micron filter.~~

b. Table 2 contains criteria ~~set for~~ to protect~~ion of~~ human health. The Water & Fish criteria apply to waters designated for domestic water supply use. The Fish Only criteria apply to waters designated for primary or secondary contact recreation use.

These changes clarify that the applicable fraction for metals criteria for both aquatic life and human health criteria is the dissolved fraction.

Subsection 210.01.b

Table 2. Criteria for Protection of Human Health (based on consumption of:)						
Compound	**[a]CAS Number**	**Carcinogen?**	**Water & Fish (µg/L unless otherwise specified)**		**Fish Only (µg/L unless otherwise specified)**	
Inorganic Compounds/Metals						
Arsenic[2]	7440382	Y	10; 8.0 µg/kg fish tissue	cdjk	~~10~~4.3; 8.0 µg/kg fish tissue	cdjl

k. Human health criteria for Water & Fish exposure to inorganic arsenic are attained if fish tissue concentrations comply with the Fish Only criterion and water column concentrations ~~meet the maximum contaminant level for inorganic arsenic provided in IDAPA 58.01.08, "Idaho Rules for Public Drinking Water Systems."~~ do not exceed 10 µg/L.

l. For Fish Only exposure to inorganic arsenic, the human health criterion is:

Fish Muscle/Fillet Tissue (µg/kg wet-weight)	Water Column (µg/L)
8.0[1]	4.3[2]

[1]Fish muscle (fillet) tissue supersedes water column element.~~: 8 µg/kg on a wet-weight basis,~~ Single measurement using sufficiently sensitive methods. ~~b~~Based on an average or composite of a minimum of five (5) individual fish of the same species, collected from the same water body and within the same calendar year, where the smallest individual is no less than seventy-five percent (75%) of the total length (size) of the largest individual. Not to be exceeded; the Department will evaluate all representative fish tissue data to determine compliance with this criterion element.

[2]Water column values are based on total inorganic arsenic in water. Water column values are the applicable criterion element only in the absence of sufficient fish tissue data.

Fish Only Exposure

For the fish only exposure, Idaho is proposing a dual-element criterion consisting of a fish tissue criterion and a water column criterion, with the fish tissue criterion superseding the water column criterion. Because of the uncertainty associated with bioaccumulation of inorganic arsenic, this two-part criterion provides a direct measure of the exposure route that is intended to be protected by allowing direct comparison of the fish tissue. In addition, it provides a water

column criterion that can be used when sufficient fish tissue data might not be available or obtainable.

Fish Tissue Criterion

The calculated fish tissue criterion of 8.0 µg/kg fish tissue is a direct measure of the exposure of Idaho fish consumers to inorganic arsenic. It is a scientifically sound calculation based on Idaho-specific exposure factors for fish consumption and will ensure fish tissue concentrations do not expose consumers to inorganic arsenic in fish tissue that would lead to an increased risk of cancer beyond the selected target incremental cancer risk factor.

However, because fish data are not always available or obtainable, DEQ believes it is appropriate to adopt a water column criterion.

Water Column Criterion

The calculated water column criterion of 4.3 µg/L is based on a TL-weighted BAF and is the applicable criterion when sufficient fish tissue data are not available. Although there is much uncertainty regarding the relationship of inorganic arsenic concentrations in the water column and fish tissue, most measures of the central tendency of inorganic arsenic BAFs are in the range of 1 to 2 L/kg (DEQ 2020); the TL-weighted BAF of 1.87 L/kg falls within this range. Therefore, a water column criterion based on the TL-weighted BAF of 1.87 L/kg would be protective of the recreation use when fish tissue data are unavailable or unobtainable.

Water & Fish Exposure

For the Water & Fish Exposure, Idaho is proposing a combined criteria approach that combines the fish tissue element with the Safe Drinking Water Act (SDWA) Maximum Contaminant Level (MCL) to ensure that the DWS use is supported.

Idaho WQS defines the DWS use as:

> *"water quality appropriate for use as untreated raw water (as defined under IDAPA 58.01.08, "Idaho Rules for Public Drinking Water Systems") for public drinking water." (IDAPA 58.01.02.100.03)*

DEQ interprets this to mean that protection of the DWS use requires that any public water system using surface waters as source water must not need to provide additional treatment prior to delivery through a public water system. Therefore, if inorganic arsenic concentrations in the source water are less than the SDWA MCL, the DWS use would be protected since the water system would not need to provide additional treatment to remove inorganic arsenic.

However, in order to account for the additional exposure through consumption of fish tissue, the fish tissue criterion must also be met in order to comply with the Water & Fish exposure. In instances when sufficient fish tissue data are not available, the Fish Only water column criterion would be the applicable criterion, as the recreation use would be the more sensitive use.

Duration and Frequency

Under the Safe Drinking Water Act (SDWA), systems must monitor annually unless they have an MCL exceedance. If systems have an MCL exceedance, they must enact quarterly monitoring and take a running average of the last 4 quarters to determine compliance with the MCL (40 CFR 141.23, applicable in Idaho under IDAPA 58.01.08.100). DEQ believes that an annual arithmetic mean (average) is at least as protective as a running average of four quarterly samples when measuring compliance with the DWS criterion.

Subsection 210.03.d.ii

ii. Frequency and duration for human health toxics criteria. Criteria in Table 2 in Subsection 210.01 are not to be exceeded based on an annual ~~harmonic~~ mean concentration.

This change is based on input from stakeholders during the negotiated rulemaking, indicating that the appropriate measure of central tendency of concentrations to compare to HHC is the arithmetic mean rather than harmonic mean.

Subsection 210.05.b

ii. When using toxicity thresholds to derive water quality criteria to protect human health, a fish consumption rate representative of the population to be protected, a mean adult body weight, an adult 90th percentile water ingestion rate, a trophic level weighted BAF or BCF, and a hazard quotient of one (1) for non-carcinogens or a cancer risk level of 10^{-5} for carcinogens shall be utilized for any compound not listed in Subsection 210.05.b.iii.

iii. Subsection 210.05.b.ii. does not apply to water quality criteria for arsenic.

This addition is necessary to allow for the adoption of a combined criteria approach to Water & Fish and a tissue-based criterion for Fish Only exposures to inorganic arsenic.

Implementation Considerations

In order to ensure protection of Idahoans from exposure to inorganic arsenic, several implementation principles should be followed.

- A fish-tissue sample is defined as a single composite or average concentration based on a minimum of five individuals from a single species. A sample can be composited or averaged from fish collected over a single calendar year, and can be combined from within the same assessment unit or immediately adjacent assessment units.
- Fish tissue samples should target gamefish species or other fish species that are commonly consumed by the general public. If sufficient gamefish data are unavailable,

or if gamefish species are not obtainable, the water column criterion should be the applicable criterion.

- Fish tissue samples must be analyzed for total inorganic arsenic using sufficiently sensitive analytical methods that provide sufficient detection limits to quantify inorganic arsenic in tissue at levels necessary for the proposed application. For example, for determining compliance with the fish tissue criterion, a sufficient fish tissue sample should have a MDL ≤ 8.0 µg/kg; for calculating site specific BAFs and translation of the fish tissue criterion to a water column value, a sufficient fish tissue sample should have an MDL ≤ 0.05 and a MRL or PQL ≤ 0.2.

Translation of the fish tissue criterion to a water column value should be based on the geometric mean BAF from paired tissue and water samples from gamefish species present at a given site. In order to calculate site specific BAFs, interested parties should provide the following information:

- Information or data to identify gamefish species present at the site.

- Paired fish tissue and water column concentrations of inorganic arsenic from all representative gamefish species in the assessment unit.

Permitting

If arsenic is a pollutant of concern, DEQ will determine if there is a reasonable potential to exceed (RPTE) arsenic human health criteria by using the water column criterion or analyzing representative gamefish tissue data submitted by the permittee. When using fish tissue data to determine RPTE arsenic human health criteria, DEQ will implement the following process:

For existing permitted dischargers where no new or increased discharge is proposed:

- Resident gamefish species should be collected, paired with water column data, and analyzed using sufficiently sensitive detection limits.

- If data from fish tissue samples in the receiving water exceed the tissue criterion of 8.0 µg/kg, then it will be determined that there is RPTE inorganic arsenic criteria and arsenic effluent limits will be implemented. Arsenic effluent limits will be calculated using the paired water column and fish tissue data to identify a BAF for deriving an appropriate water column effluent limit.

- If data from fish tissue samples in the receiving water do not exceed the fish tissue criterion of 8.0 µg/kg, and no increased discharge of arsenic is proposed in the permit, then it will be determined that there is no RPTE the inorganic arsenic criterion, and since the fish tissue criterion value supersedes the water column arsenic criterion value, water column effluent limits will not be required.

For new dischargers or for dischargers proposing increased discharge:

- Resident gamefish species should be collected and paired with water column data with sufficiently sensitive detection limits.

- If data from fish tissue samples in the receiving water exceed the tissue criterion of 8.0 µg/kg, then it will be determined that there is RPTE inorganic arsenic criteria and arsenic effluent limits will be implemented. Arsenic effluent limits will be calculated using the paired water column and fish tissue data to identify a BAF for deriving an appropriate water column effluent limit.

- If data from fish tissue samples in the receiving water do not exceed the fish tissue criterion, the permittee will be required to provide annual monitoring of fish tissue in order to demonstrate continued compliance with the fish tissue criterion. If after two years of annual fish tissue monitoring that do not exceed the fish tissue criterion, DEQ may develop a site specific BAF and translate the fish tissue criterion to a water column value for future compliance.

In the absence of sufficient fish tissue data, the water column criterion is the applicable criterion and would be the basis for determining RPTE and deriving effluent limits.

Steady State

DEQ believes that the proposed rule and implementation principles outlined above would account for changing or increasing arsenic conditions. Unlike other metals such as mercury and selenium, the data available to DEQ indicates inorganic arsenic is not highly bioaccumulative. Therefore, there is little concern that small, incremental changes in water chemistry would result in significant changes in fish tissue.

Incidental Ingestion

While the fish tissue criterion does not explicitly account for incidental ingestion of small amounts of water by swimmers and other recreationists, DEQ believes that the proposed HHC provide adequate protection from exposure to inorganic arsenic from incidental ingestion of water during water-based recreation such as swimming.

The HHC calculations provide protection at a lifetime exposure at the criterion concentration and at the exposure levels. For example, a hypothetical individual consuming 0.0665 kg of fish and 2.4 L of water a day, *every day* for their lifetime, would be expected to have an increased risk of cancer equivalent to the incremental cancer risk factor of 1×10^{-5} if the fish tissue being consumed is at the criterion of 8.0 µg/kg.

According to the EPA *Exposure Factors Handbook* (EPA 2011), the maximum ingestion rate of water while swimming is 71 mL/hour for adults over 18 years of age, and the 97^{th} percentile ingestion rate for children 0 to 18 is 120 mL/hour. A conservative estimate of daily incidental ingestion of water from swimming can be calculated based on these ingestion rates and the mean minutes per month spent swimming by age group provided in the *Exposure Factors Handbook* (EPA 2011). The resulting daily incidental ingestion rate

is less than 3.5 mL/day. DEQ believes that this incidental ingestion rate is negligible and, therefore, does not believe incidental ingestion of water should be accounted for in determining inorganic arsenic criteria to support recreational uses.

Discussion

The proposed draft criteria are based on sound science, protective of the beneficial uses, and practical and achievable for Idaho stakeholders.

For the Fish Only exposure, the fish tissue criterion allows for a direct measure of support of recreational uses. It is based on our current understanding of inorganic arsenic toxicity and Idaho's recently updated exposure factors.

When fish data are not available or unobtainable, a water column criterion based on the range of inorganic arsenic BAFs found in Idaho waters ensures that appropriate regulatory mechanisms exist to protect water quality and Idaho recreational users. In addition, this water column value can be used as the applicable criterion for dischargers or other interested parties that do not have the means, expertise, or desire to collect costly and technically complicated fish tissue data to measure compliance with criteria or determine the need for and/or concentration of inorganic arsenic effluent limits.

For the Water & Fish exposure, the adoption of the combined criteria framework would ensure that the DWS use is fully supported, while continuing to account for consumption of fish tissue from Idaho waters.

The implementation principles outlined in this discussion paper ensure that all Idaho waters would be adequately protected for recreational uses, and that any waters designated for DWS will be adequately protected as source water for public drinking water systems.

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