

August 21, 2020

Via email: paula.wilson@deq.idaho.gov

Ms. Paula Wilson
Idaho Dept. of Environmental Quality
1410 N. Hilton
Boise, ID 83706

Dear Ms. Wilson:

The Idaho Association of Commerce & 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 arsenic water quality criteria values have a direct impact on requirements for water discharge or clean-ups for several IACI members, and IACI appreciates this opportunity to provide comments on the Department of Environmental Quality's (the Department) rulemaking to revise the arsenic human health water quality criteria.

These criteria have been in flux for Idaho waters for over two decades and been subject to litigation and disagreement between the State of Idaho and EPA as to what criteria is protective of human health. As the Department is aware, arsenic naturally occurs in Idaho ground and surface waters that greatly exceed EPA's 304(a) recommended criteria. The Department is to be commended for the extensive studies done looking at arsenic concentrations in fish tissue and water.

These comments reflect a very thorough review of the data collected by the Department and discuss potential approaches to setting new arsenic human health water quality criteria for our great state. Your careful consideration of these comments would be appreciated.

Sincerely,



Alex LaBeau
President

cc: Alan Prouty, Chair
IACI Environment Committee

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1. Introduction

The State of Idaho has wrestled for over three decades with reconciling the uncertainty in the science on the toxicity of arsenic, how to account for naturally occurring high concentrations of arsenic in Idaho groundwater and surface water, the utilization of that science in establishing appropriate regulatory (water quality) criteria, and conflict with the U.S Environmental Protection Agency (USEPA) over the appropriate criteria. This uncertainty and conflict continues today. Reconciling these issues was well illustrated in a 2007 letter from then Department of Environment Quality (Department) Director Hardesty in which she discussed the use of the Safe Drinking Water Act Maximum Contaminant Level (MCL) as a human health water quality criterion for arsenic:¹

“...Second was the concern for cities with a ground water based public water supply that exceeds 10 µg/L arsenic criterion and the associated arsenic concentration in the NPDES wastewater discharge, a situation not uncommon in Idaho. This is made even more difficult by the fact the efforts to treat water supplies to achieve the new drinking water requirement will likely leave even higher concentrations of arsenic to be discharged by public wastewater systems.”

Idaho is now engaged in another rulemaking to determine appropriate arsenic human health water quality criteria. This rulemaking is the Department's fourth, starting in 1997 in establishing these criteria.

1.A. Arsenic in Idaho Waters

Arsenic occurs naturally in soils and waters in the West, including Idaho. The Idaho Department of Water Resources published a very comprehensive review of the geological origin of arsenic in Idaho.² This study includes data from measurements of arsenic in groundwater at 255 sites. 15% of the sites sampled had arsenic concentrations greater than 10 µg/L. Previous studies conducted by the Department have shown total arsenic (As_(total)) concentrations in surface water that range from less than 1 microgram per liter (µg/L) up to 17 µg/L (see Appendix A).³ In recent years, the Department has conducted a targeted monitoring program begun in August 2019 of 40 different sampling locations has to date recorded arithmetic mean inorganic arsenic (As_(in)) concentrations ranging from 0.06 to 12 µg/L with an overall state-wide arithmetic

¹ Idaho DEQ. 2007. Idaho's Human Health Arsenic Water Quality Criteria, reply to ICL Letter of April 5, 2007.

² Idaho Department of Water Resources. 2002. Technical Summary Arsenic Results from the Statewide Program, 1991-2001.

³ Essig, D. 2010. Arsenic, Mercury and Selenium in Fish Tissue and Water from Idaho's Major Rivers: A Statewide Assessment. Idaho Department of Environmental Quality. March 2010.

mean of 1.7 µg/L (Table 1). Geographic locations of the 40 targeted surface water monitoring stations are presented in Appendix B.

Table 1
Summary of August 2019 to May 2020 As_(in) Surface Water Monitoring Results

Sample Location ID	Sample Size	Stream/River ID	Frequency of Detects (%)	Min Detect	Max Detect	Arithmetic Mean	Harmonic Mean	Median	10th Percentile	90th Percentile
AST001	8	Kootenai River	100	0.184	0.268	0.209	0.207	0.205	0.188	0.232
AST002	8	SF Coeur d'Alene River	100	0.287	0.975	0.514	0.438	0.421	0.32	0.813
AST003	8	Priest River	100	0.221	1.67	0.625	0.408	0.435	0.255	1.292
AST004	8	NF Coeur d'Alene River	100	0.11	0.191	0.149	0.144	0.148	0.118	0.18
AST005	8	St. Maries River	100	0.044	0.152	0.0943	0.079	0.095	0.0489	0.142
AST006	8	Palouse River	100	0.141	0.39	0.221	0.201	0.193	0.158	0.32
AST007	8	Potlatch River	87.5	0.047	0.143	0.079	0.066	0.077	0.0449	0.135
AST008	8	Paradise Creek	100	0.18	1.11	0.438	0.328	0.38	0.198	0.712
AST009	8	Snake River	100	1.18	3.55	3.125	2.750	3.45	2.496	3.508
AST010	8	MF Clearwater River	62.5	0.044	0.089	0.055	0.051	0.064	0.04	0.0785
AST011	8	Threemile Creek	100	0.05	0.215	0.0984	0.085	0.0825	0.0696	0.139
AST012	8	NF Payette River	87.5	0.047	0.105	0.060	0.056	0.056	0.0449	0.0763
AST013	8	Little Salmon River	100	0.089	0.257	0.183	0.162	0.186	0.117	0.251
AST014	6	Gold Fork River	100	0.053	1.24	0.424	0.177	0.251	0.142	0.88
AST015	8	Weiser River	100	0.049	0.314	0.187	0.128	0.207	0.0693	0.295
AST016	8	Mann Creek	100	4.21	19.8	12.35	9.817	13.45	6.114	17.35
AST017	8	Squaw Creek	100	0.087	0.379	0.16	0.134	0.127	0.104	0.252
AST018	8	Deadwood River	100	0.192	0.408	0.332	0.308	0.373	0.209	0.395
AST019	8	MF Boise River	100	1.49	3.03	2.281	2.203	2.23	1.952	2.666
AST020	8	Mores Creek	100	1.65	3.7	3.226	3.024	3.49	2.539	3.679
AST021	8	Bruneau River	100	2.34	11.9	7.426	5.993	7.295	4.734	10.21
AST022	8	Big Wood River	100	0.512	0.689	0.597	0.590	0.592	0.518	0.674
AST023	7	Rock Creek	100	2.39	4.82	3.867	3.680	4.08	2.906	4.706
AST024	8	Salmon River	100	1.91	2.35	2.153	2.140	2.185	1.938	2.329
AST025	8	Salmon River	100	0.934	2.33	1.388	1.242	1.2	0.935	2.232
AST026	7	Snake River	100	1.34	3.53	2.057	1.841	1.75	1.412	3.02
AST027	9	Portneuf River	100	1.52	2.77	2.352	2.282	2.45	1.984	2.746
AST028	4	Bear River	100	0.507	2.25	1.201	0.904	1.024	0.612	1.932
AST029	9	Blackfoot River	100	1.08	2.02	1.414	1.336	1.19	1.08	1.852
AST030	8	Blitch Creek	100	0.101	1.08	0.626	0.380	0.686	0.311	0.904
AST031	8	Henry's Fork	100	1.06	1.58	1.335	1.318	1.32	1.172	1.51

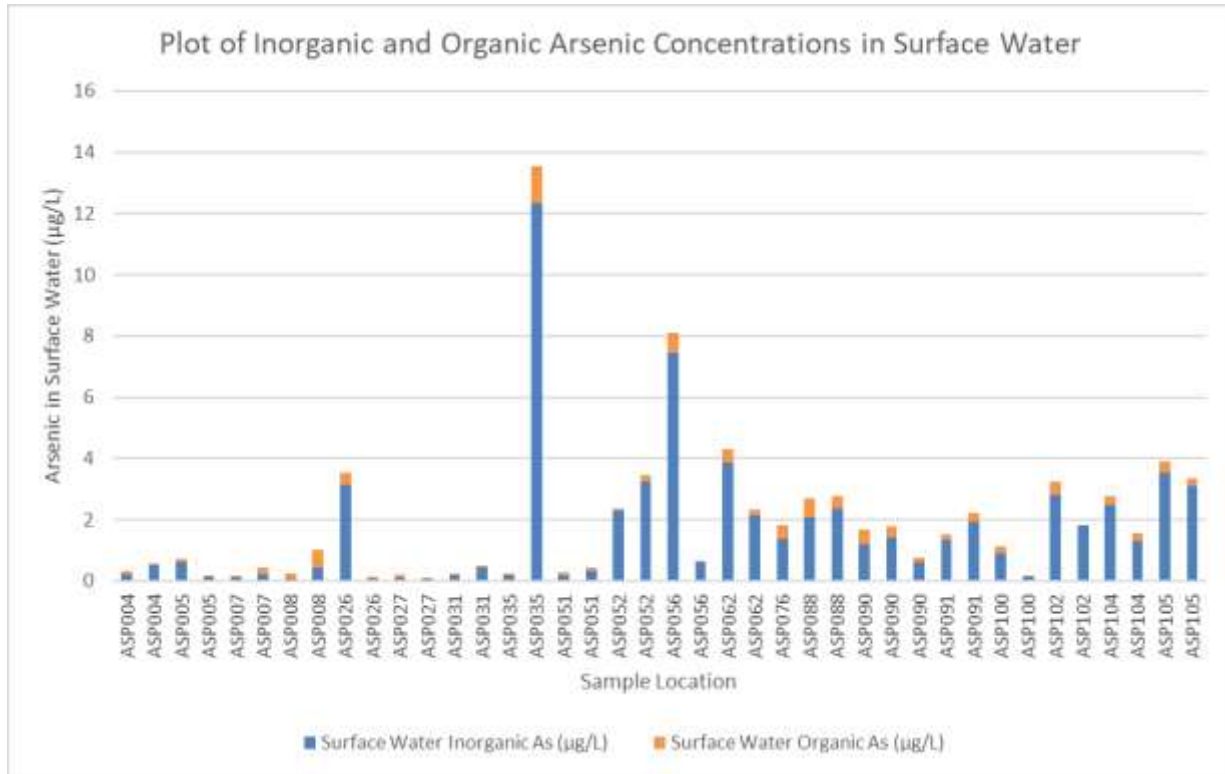
Notes:

All non-detects had a detection limit of 0.04 µg/L.

Arithmetic mean - calculated with ND=DL for non-detects

At virtually all targeted monitoring stations the majority of total arsenic in surface water is comprised of inorganic arsenic (As_(in)) (Figure 1). In contrast to the water column, in fish tissue, virtually all of the arsenic is present in organic forms and only a small portion is present as inorganic arsenic, the form which is potentially toxic to human health (Figure 2).

Figure 1
Plot of Inorganic and Total Arsenic Concentrations in Surface Water

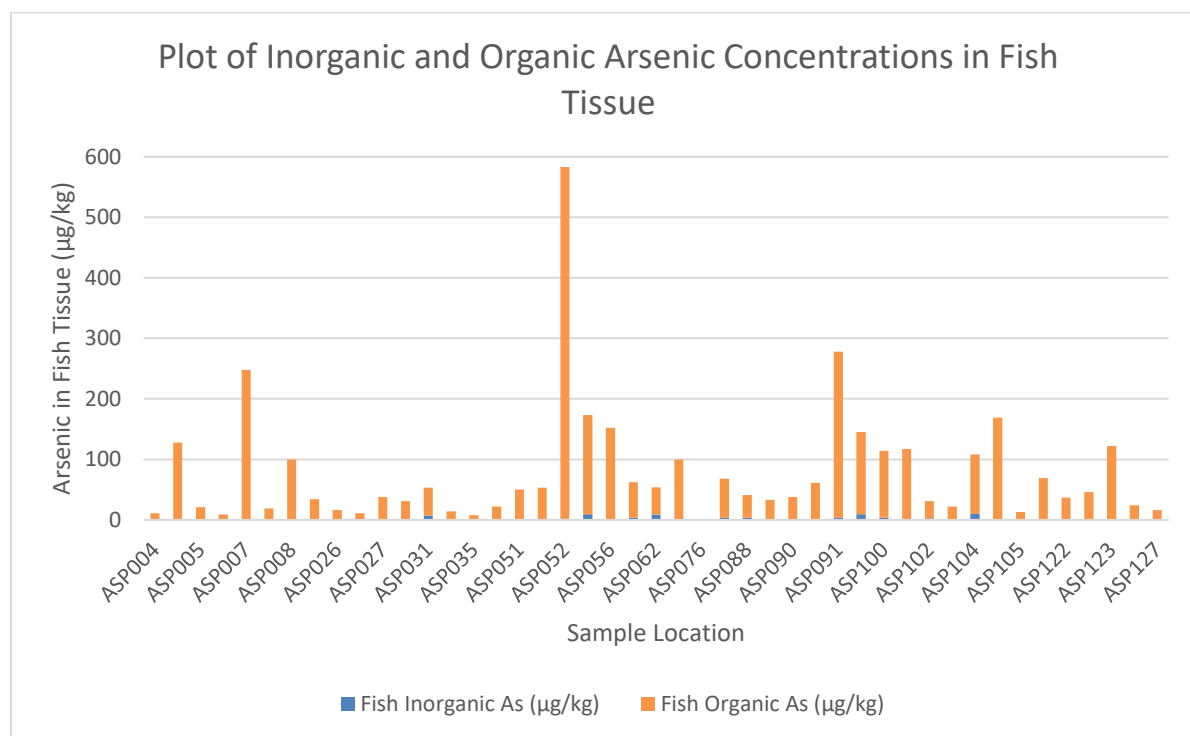


Notes:

Arsenic concentrations averaged over eight sampling periods from August 2019 – May 2020.

Organic arsenic was estimated as the total arsenic concentration minus the inorganic arsenic concentration as reported by the laboratory.

Figure 2
Plot of Inorganic and Total Arsenic Concentrations in Fish Tissue

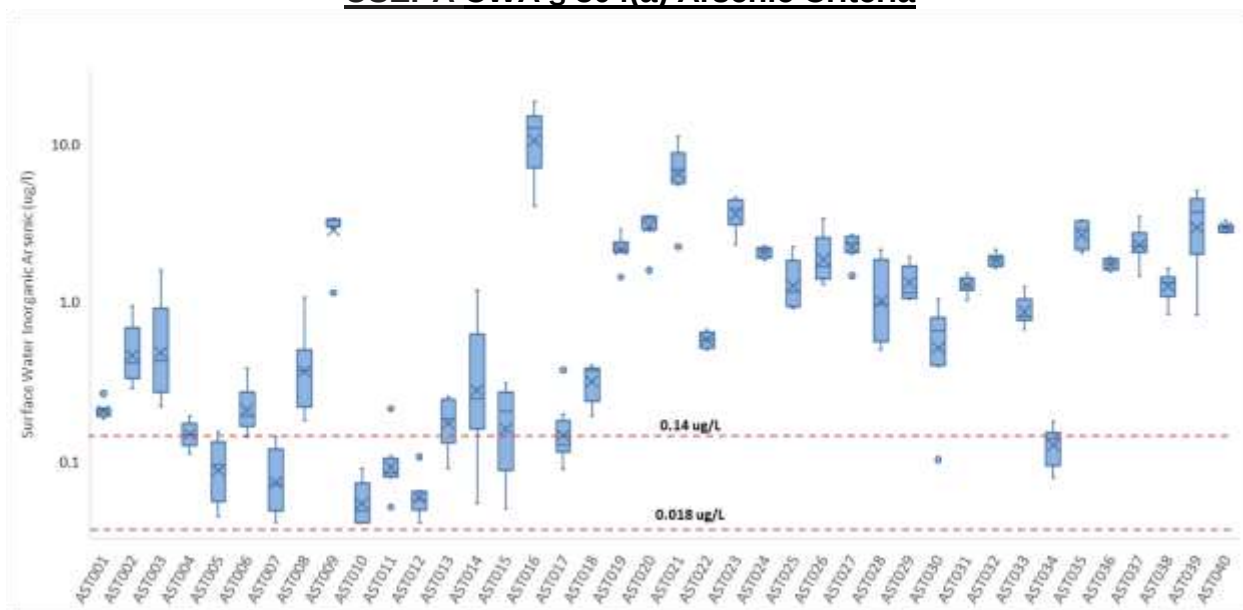


Only six monitoring sites had $As_{(in)}$ concentrations less than the EPA CWA 304(a) human health (HH) organism only water quality criteria (WQC) of $0.14 \mu\text{g/L } As_{(in)}$; no monitoring sites had an arsenic concentration that met the water and organism HH WQC of $0.018 \mu\text{g/L } As_{(in)}$ (Figure 3).⁴ It is doubtful that water with 18 parts per trillion ($0.018 \mu\text{g/L}$) can be found anywhere except in the laboratory. The conclusion from comparing concentrations of arsenic in Idaho waters shows that the 304(a) criteria are inappropriate and unattainable for all major surface waters sampled in Idaho and such criteria were derived using overly conservative assumptions. Additionally, the EPA WQC for HH did not consider the fact that arsenic is not DNA reactive, is not a direct carcinogen and has been shown to have a threshold for effects.⁵

⁴ 40 CFR § 131.36(b)(1).

⁵ Tsuji S.J. et al. 2019. Dose-response for assessing the cancer risk of inorganic arsenic in drinking water: the scientific basis for use of a threshold approach. *Critical Reviews in Toxicology*. 49(1), p. 36-84.

Figure 3
August 2019 to May 2020 As_(in) Surface Water Monitoring Results Compared to
USEPA CWA § 304(a) Arsenic Criteria



Notes:

0.14 µg/L = EPA CWA 304(a) HH WQC (organism only)

0.018 µg/L = EPA CWA 304(a) HH WQC (water + organism)

Middle line = median

X = arithmetic mean

Bottom line of the box represents the median of the bottom half or 1st quartile.

Top line of the box represents the median of the top half or 3rd quartile.

Whiskers = minimum and maximum values

Dots = outliers (a data point is considered an outlier if it exceeds a distance of 1.5 times the IQR below the 1st quartile or above the 3rd quartile)

1.B. Regulatory History

Idaho's history with the human health water quality standard for arsenic has been one of almost constant flux and disagreement with USEPA on appropriate values (see Table 2). When USEPA promulgated the National Toxics Rule (NTR) in 1992, it was made applicable to Idaho. Those values were 0.14 µg/L As_(in) for consumption of fish only and 0.018 µg/L As_(in) for fish and water consumption. In 1994, Idaho adopted the NTR by reference, however, the Idaho Legislature in 1995 revised the Idaho arsenic human health criteria. It is not clear that EPA ever acted on this legislative change. However, since Idaho had adopted the NTR by reference, EPA removed Idaho from the NTR in 1997.

In 1997, DEQ did initiate a new rulemaking on the human health water quality criteria for arsenic. The negotiated rulemaking value proposed to the Board of DEQ was 25 µg/L; the Board however adopted a temporary rule of 50 µg/L for both fish consumption and

water and fish consumption. This change in the criteria was approved by the Idaho legislature in 1999. However, EPA took no immediate action on this new criterion.

In 2005, the Department commenced a new rulemaking on the arsenic human health water quality criteria. The focus of the rulemaking was to change the criteria to the new (2001) MCL value for arsenic of 10 µg/L. Due to a number of questions/issues raised, no change in the criteria was proposed.

In 2008, Advocates for the West, representing the Idaho Conservation League filed against USEPA a Notice of Intent to Sue over USEPA's failure to act on the 1999 submittal by Idaho. This led to another Idaho rulemaking in 2009 and resulted in arsenic human health criteria of 10 µg/L_(in) (for both fish consumption and water and fish consumption). These criteria were approved by the Idaho legislature in 2010 and approved by USEPA later that year.

Northwest Environmental Advocates (NWEA) filed a complaint against USEPA in 2015 challenging USEPA's 2010 approval of Idaho's arsenic human health water quality criteria. The primary rationale for the complaint was that USEPA's approval of the MCL value (10 µg/L) was not consistent with EPA's own guidance that recommended that states *not* adopt Safe Drinking Water Act (SDWA) MCLs as human health water quality criteria for CWA purposes.

In 2016, USEPA reached an agreement with NWEA in which they agreed to a new action on Idaho's 2010 criteria submittal and they would essentially have new arsenic human health criteria in place for Idaho by July 15, 2019. USEPA's new action was reversing its prior approval of Idaho's 10 µg/L criteria; USEPA also disapproved the 50 µg/L criteria that had been submitted in 1999. The 10 µg/L criteria is still in place for purposes of the Clean Water Act.

The settlement agreement with NWEA was modified in 2018 to allow EPA to finish the Integrated Risk Information System (IRIS) Toxicological Review of Inorganic Arsenic in 2021. It is USEPA's intent that information from this review would be helpful in establishing a new arsenic human health water quality criterion for Idaho. The date for taking action on a new criterion for Idaho was moved to November 15, 2023.

The current rulemaking by the Department was initiated to utilize state specific information on inorganic arsenic concentrations in fish and state waters to develop new arsenic human health water quality criteria. The utilization of state specific information would allow the best science and most relevant environmental data to be used to develop arsenic water quality criteria for Idaho.

Table 2
As Human Health Water Quality Criteria History

Year	Action	Standard: recreation (µg/L) _(in)	Standard: recreation and water supply (µg/L) _(in)	Notes
1992	EPA: NTR applicable to Idaho	0.14	0.018	
1994	Idaho: adopts NTR by reference	0.14	0.018	
1995	Idaho: Legislature revises criteria	6.2	0.02	It is not clear that EPA ever acted on these criteria.
1997	EPA: finalizes removing Idaho from NTR	0.14	0.018	
1997/1999	Idaho: DEQ Board approves temporary rule changing standard. Approved by legislature in 1999.	50	50	EPA did not act on this change till 2016, in which it was denied.
2005	Idaho: new negotiated rulemaking on As criteria; no consensus reached on changes to criteria.			
2008	ICL files intent to sue over EPA's failure to act on 1999 submittal.			
2010	Idaho: changes criteria to be consistent with MCL.	10	10	EPA approved these criteria in 2010.
2015	Northwest Environmental Advocates files complaint over EPA's 2010 approval of Idaho's			
2016	EPA: (a) settles complaint by agreeing to take <i>new</i> action and adopt replacement criteria by November 15, 2019. (b) disapproves both the 1999 and 2010 Idaho criteria.			
2018	EPA: reaches a modified agreement with plaintiffs; will adopt new Idaho criteria by November 15, 2023.			EPA also discusses finishing IRIS assessment for As _(in) in 2021.
2018	Idaho: starts a new negotiated rulemaking on As criteria.			

1.C. Regulatory Framework and Issue

Human health water quality criteria (WQC) have to protect designated beneficial uses. For purposes of the arsenic criteria, the applicable designated beneficial uses are recreation and water supply. These lead to the development of two criteria values:

- A criterion for the consumption of fish only (recreation use); and
- A second criterion for the consumption of fish and water (water supply and recreation uses).

Often water quality criteria adopted by the states are based on EPA's own Clean Water Act (CWA) section 304(a) recommended criteria. States can develop their own criteria as long as such criteria protect the designated use and are based on sound scientific rationale.⁶ EPA developed section 304(a) criteria for arsenic in 1992 (Table 2).

Table 3
EPA CWA § 304(a) Arsenic_(in) Criteria

	Criteria⁷ (µg/L)
Water and organisms	0.018
Organisms only	0.14

EPA's section 304(a) recommended criteria for arsenic have been problematic for a couple reasons. First, there has been considerable debate on the scientific basis of the assumptions about the toxicity of inorganic arsenic used to develop EPA's recommended criteria. Second, more than 25 years have passed since EPA developed the recommended criteria shown in Table 3. During that time new information affecting exposure assumptions used to develop the 1992 criteria has also become available. For example, new information about the bioaccumulation and speciation of arsenic in fish indicates EPA's 1992 criteria overestimate bioaccumulation of inorganic arsenic in fish. Third, especially for Western states, arsenic is prevalent in the natural landscape. Thus, surface and groundwater often have concentrations greatly exceeding EPA's recommended 304(a) criteria.

This has led to states developing a number of different approaches to setting arsenic human health water quality criteria. These approaches have included:

- Derivation of state specific criteria values using state specific values for parameters such as bioaccumulation factors (BAFs), speciation of arsenic in fish tissue, and allowable risk, among other factors;
- Background or natural concentrations of arsenic; and

⁶ 40 CFR § 131.11(a).

⁷ Criteria assume an allowable excess lifetime cancer risk level of 1×10^{-6} . Assuming Idaho's allowable risk level of 1×10^{-5} , the values would be 0.18 and 1.4 µg/L respectively.

- Use of Safe Drinking Water Act (SDWA) maximum contaminant levels (MCLs).

Western states have a wide variety of arsenic water quality criteria. Six of the fourteen states have either a water and organism criteria or organism only criteria value that is 10 µg/L or higher (Table 4). Four states have as criteria the EPA 304(a) values, one of which was imposed by EPA.⁸ States in other areas of the country also have adopted a range of WQC for arsenic including the 10 µg/L MCL (Table 5). The values in Table 5 were obtained using a EPA's relatively new [WQS Search Tool](https://www.epa.gov/wqs-tech/state-specific-water-quality-standards-effective-under-clean-water-act-cwa), which provides access to a compilation of state-specific water quality standards that are either approved by EPA or are otherwise in effect for Clean Water Act purposes (<https://www.epa.gov/wqs-tech/state-specific-water-quality-standards-effective-under-clean-water-act-cwa>).

⁸ The State of Washington, like Idaho, finalized arsenic human health water quality criteria of 10 µg/L. EPA disapproved those criteria in 2016 and substituted the National Toxics Rule (NTR) criteria values, which for arsenic are the same as the Section 304(a) recommended criteria.

Table 4
Summary of Arsenic Water Quality Criteria - Western States

State	Effective Date	Drinking Water (µg/L)	Water and Organism (µg/L)	Organism Only (µg/L)	Notes
Alaska	2008	10	--	--	Alaska drinking water criterion is based on the federal maximum contaminant level (Safe Drinking Water Act). The reference column in the Alaska Water Quality Criteria for Toxics and Other Deleterious Substances Table for arsenic human health refers to federal code 63 FR 10140, which states that EPA withdraws the applicability to Alaska's waters of the federal human health criteria for arsenic. Alaska does not appear to have established its own state-specific human health surface water quality criteria for arsenic.
Oregon	2014	--	2.1	2.1 (freshwater) 1.0 (saltwater)	Oregon human health water criteria are given for consumption of water and organisms and consumption of organisms only. The organism only freshwater criterion is based on a risk level of approximately 1.1×10^{-5} , and the water and organism criterion is based on a risk level of 1×10^{-4} .
Washington	2016	--	0.018	0.14	EPA disapproved of Washington's proposed 2016 water quality criteria for consumption of water and organisms (10 µg/l) and organisms only (10 µg/l). Therefore, the Clean Water Act-effective criteria are those that EPA originally promulgated for Washington in the National Toxics Rule for consumption of water and organisms (0.018 µg/l) and organisms only (0.14 µg/l).
California	2008	10	0.018	0.14	California drinking water criterion is based on the federal maximum contaminant level (Safe Drinking Water Act). The human health surface water quality criteria for consumption of water and organisms and organisms only are based on the federal National Toxics Rule.
Arizona	2016	10	--	80	Arizona human health water quality criterion is based on the federal maximum contaminant level (Safe Drinking Water Act) for drinking water (called "domestic water source" and defined as the use of a surface water as a source of potable water in Arizona administrative code). The fish consumption value of 80 µg/l is defined in Arizona administrative code as the use of a surface water by humans for harvesting aquatic organisms for consumption. Harvestable aquatic organisms include, but are not limited to, fish, clams, turtles, crayfish, and frogs.
Nevada	2018	50	--	--	Nevada water quality criterion is the maximum contaminant level (Safe Drinking Water Act) for drinking water and contact recreation uses. No values are given for consumption of water and organisms or consumption of organisms only. 50 µg/l is the federal maximum contaminant level for arsenic prior to 2001. 10 µg/L is the new federal maximum contaminant level standard.
Utah	2016	10	10	10	Utah human health water quality criteria for drinking water, the consumption of water and organisms, and the consumption of organisms only are based on the federal maximum contaminant level (Safe Drinking Water Act) for drinking water (called "domestic source uses" in Utah administrative code).
New Mexico	2017	10	--	0.14	New Mexico drinking water criterion is based on the federal maximum contaminant level (Safe Drinking Water Act) for drinking water (called "domestic water supply" in New Mexico administrative code). No specific human health surface water criteria for consumption of water and organisms or consumption of organisms only are provided. New Mexico administrative code appears to state that if no state-specific human health surface water quality values are provided for the consumption of organisms only, then the federal Clean Water Act criteria for consumption of organisms only is in effect.
Texas	2014	--	10	--	Texas human health water quality criterion is for the consumption of water and organisms and is based on the federal maximum contaminant level (Safe Drinking Water Act) for drinking water. No separate value is given for drinking water only or consumption of organisms only.
Montana	2004	10	10	--	Montana drinking water and human health surface water quality criteria are based on the federal maximum contaminant level (Safe Drinking Water Act) for drinking water. Montana assumes that surface water criteria are for the consumption of water and organisms. No organism only criteria are provided.
Wyoming	2018	--	10	10	Wyoming human health surface water quality criteria for consumption of fish and organisms or consumption of organisms only are based on the federal maximum contaminant level (Safe Drinking Water Act).
Colorado	2018	0.02 - 10	0.02	7.6	The Colorado drinking water criterion (called "domestic water supply" in Colorado administrative code) is a range of values. The first number in the range is a strictly health-based value, based on the Colorado Water Quality Control Commission's established methodology for human health-based standards. The second number in the range is a maximum contaminant level, established under the federal Safe Drinking Water Act that has been determined to be an acceptable level of this chemical in public water supplies, taking treatability and laboratory detection limits into account. Human health surface water criteria are provided for consumption of water and organisms and consumption of organisms only.
South Dakota	2015	--	0.018	0.14	South Dakota human health surface water quality criteria for the consumption of water and organisms and consumption of organisms only are provided and based on the federal National Toxics Rule.
North Dakota	2014	--	10	--	North Dakota human health surface water quality criterion is for the consumption of water and organisms and is based on the federal maximum contaminant level (Safe Drinking Water Act) for drinking water. No separate value is given for consumption of organisms only.

Notes:

The table contains three sets of HH WQC including Drinking Water, Water and Organism and Organism Only. Several states have a designated use of domestic (or drinking) water supply and have developed HH WQC for that designated use in addition to or instead of having HH WQC for Water and Organism and Organism Only. In many cases the Drinking Water HH WQC is equal to the Maximum Contaminant Level developed as part of the Safe Drinking Water Act.

Table 5
Summary of Arsenic Water Quality Criteria – Nation Wide

State	Domestic Water Supply (µg/L)	Organism Only (µg/L)	Water and Organism (µg/L)
Alabama	--	See equation	See equation
Connecticut	--	0.021	0.011
Delaware	--	--	10
Florida	--	50	10
Georgia	--	50	10
Illinois	50	--	--
Iowa	--	50	0.18
Kansas	10	--	--
Kentucky	10	--	--
Louisiana	10	--	--
Maine	--	0.028	0.012
Maryland	--	1.4	0.18
Massachusetts	--	0.14	0.018
Minnesota	10	--	--
Mississippi	--	24	0.078
Missouri	50	--	--
Nebraska	0.18	--	--
Nevada	50	--	--
New Hampshire	--	0.14	0.018
New Jersey	--	12.9 (saltwater) 73.4 (freshwater)	10
New Mexico	--	9	10
New York	50	--	--
North Carolina	--	--	10
Ohio	10	--	--
Oklahoma	40	205	--
Pennsylvania	10	--	--
Rhode Island	--	1.4	0.18
South Carolina	--	10	10
Tennessee	--	10	10
Texas	--	--	10
Vermont	--	1.5	0.02
Virginia	--	--	10
Washington DC	--	0.14	--
West Virginia	--	10	10
Wisconsin	0.2	--	--

Notes:

The table contains three sets of HH WQC including Drinking Water, Water and Organism and Organism Only. Several states have a designated use of domestic (or drinking) water supply and have developed HH WQC for that designated use in addition to or instead of having HH WQC for Water and Organism and Organism Only. In many cases the Drinking Water HH WQC is equal to the Maximum Contaminant Level developed as part of the Safe Drinking Water Act.

As the 2018 negotiated rulemaking commenced, IACI made the following recommendations to the Department:⁹

1. “Develop additional data on arsenic water quality and paired water arsenic/fish tissue values, including samples collected in undisturbed mineralized areas of the state. These data will be helpful in developing Idaho-specific BAFs, estimates of speciation of arsenic in fish tissue and surface water, and identifying Idaho waters where use of CWA implementation tools (such as use attainability analysis) might be warranted. The sampling plan for such a study should be made available for public review and comment.
2. Evaluate alternative approaches to assessing the toxicity of arsenic, including use of Idaho-specific data.
3. The data gathered and alternative approaches can potentially be used for:
 - a. The development of Idaho specific arsenic criteria that use state specific data (such as BAF, arsenic speciation, and fish consumption rate) and an alternative toxicity assessment approach;
 - b. Developing organism only criteria for water bodies that are not designated as drinking water supply. Preliminary calculations derive an Idaho-specific criterion of 15 µg/L; and
 - c. Identification of water bodies where criteria would be based on natural background conditions or a use attainability analysis.”

Since the time that IACI provided those comments and recommendations (in August 2018), the Department has gathered additional data and information relevant to the establishment of a new arsenic human health water quality criteria. The remainder of these comments provide: (a) a review and analysis of the data gathered; (b) the application of these data to new water quality criteria (c) discussion of several potential options for the establishment of new arsenic human health water quality criteria; and finally (d) recommendations for the Department to consider.

⁹ Idaho Association of Commerce and Industry. 2018. Comments to the Idaho Department of Environmental Quality on Revising the Arsenic Human Health Water Quality Criteria.

2. The Science of Arsenic in Idaho Waters and Fish

2.A. Background Concentrations

Arsenic occurs naturally in the environment in several valences (e.g., arsenic III, arsenic V) and many forms (e.g., organic and inorganic). Inorganic arsenic (As_(in)) is acknowledged by the scientific community to be the most toxic form of arsenic. As a result, the Department's sampling and monitoring programs have focused on measuring concentrations of As_(in) in surface water and fish tissue for the purpose of gathering data that could be used for the establishment of new arsenic human health water quality criteria.

The results collected to date from DEQ's targeted state-wide surface water monitoring program provide an excellent sense of the range of As_(in) background concentrations in Idaho surface waters. Concentrations of As_(in) range from non-detect with a detection limit of 0.04 µg/L to 19.8 µg/L (Table 1). Arithmetic mean concentrations of inorganic arsenic at the 40 targeted surface water monitoring locations range from 0.055 µg/L to 12.35 µg/L (Table 1, Figure 3). DEQ also collected inorganic arsenic surface water concentration data as part of the 2019 probabilistic fish tissue sampling program. The range of inorganic arsenic surface water concentrations from those 24 locations is similar to the ongoing monitoring program (Table 6) providing further evidence of the widespread presence of inorganic arsenic in Idaho surface waters.

Table 6
Comparison of As_(in) Surface Water Concentrations from the 2019 Targeted and Probabilistic Monitoring Programs

Dataset	Sample Size	Detects	Non-Detects	Minimum Detect	Maximum Detect	Arithmetic Mean	Harmonic Mean	Median	10th Percentile	90th Percentile
Targeted Surface Water (Aug 2019 - May 2020)	309	304	5	0.044	19.8	1.68	0.25	1.01	0.08	3.5
Probabilistic Surface Water/Fish Tissue (Aug - Oct 2019)	48	46	2	0.076	8.1	1.53	0.31	1.01	0.13	4.2

Notes:

Detection limit= 0.04 µg/L

2.B. Bioaccumulation of Arsenic in Fish Tissue

The Department is to be commended for undertaking a comprehensive state-wide sampling program to better understand the relationship between concentrations of inorganic arsenic in surface water and concentrations of inorganic arsenic in fish tissue, the results of which can be used to inform development of a bioaccumulation factor (BAF) for use in establishing human health water quality criteria for arsenic in Idaho waters. The 2019 dataset is exceptionally robust and represents a one-of-a-kind study given the large number of sampling locations and their geographic coverage. Additional paired tissue/surface water data collected in the same manner are unlikely to change

the 2019 findings. Moreover, the similarity of inorganic arsenic surface water concentrations in the probabilistic paired fish tissue/surface water sampling program and the more expansive targeted ongoing surface water monitoring program (Table 6) indicates that the inorganic arsenic fish tissue concentrations measured as part of the probabilistic fish tissue sampling program are representative of inorganic arsenic fish tissue concentrations in most Idaho surface waters.

Historically, BAFs have often been calculated simply as the ratio of the concentration of a substance in fish to the concentration of that substance in water. If only a single paired sample was available, the fish to water concentration ratio from that sample was assumed to be the BAF. If more than one paired sample was available, an overall BAF was estimated by taking the mean of all the BAFs calculated for each sample, as DEQ did when developing the BAF of 1.18 L/kg presented during the 15 July 2020 rulemaking meeting. However, even though a BAF can be calculated in this manner, it turns out that does not mean it is an accurate or appropriate predictor of bioaccumulation. Regression analysis represents a superior method to determine whether a relationship exists between water and fish tissue concentrations.¹⁰ If a statistically significant relationship exists, that relationship represents the BAF. The absence of a statistically significant relationship, as is the case in Idaho, indicates that the concentration of a substance in fish tissue is not related to the concentration of the substance in surface water and therefore, a meaningful biologically-based BAF cannot be derived. Consequently, based on the existing data, a BAF should not be used to predict fish tissue concentrations based on surface water concentrations.

Three regression analyses were conducted using the 2019 paired fish tissue/surface water data collected by the Department. The analyses differed based on the treatment of surface water and fish tissue samples with non-detect inorganic arsenic concentrations. One regression analysis assumed non-detects have an inorganic arsenic concentration equal to the detection limit. Another assumed non-detects have an inorganic arsenic concentration equal to the one half the detection limit. The third regression analysis used only paired samples in which inorganic arsenic was detected in both surface water and fish tissue. All of the regression analyses confirmed the key finding presented by the Department.^{11,12} Namely that a statistically significant relationship between the concentration of inorganic arsenic concentrations in surface water and the concentration of inorganic arsenic in fish tissue does not exist (Table 7, Figure 4). Previous work by Arcadis did not identify statistically significant relationships between the concentration of arsenic in surface water and fish tissue when accounting for fish species or size or speciation of arsenic (see Appendix C).¹³

¹⁰ Arcadis. 2018. Idaho Arsenic Human Health Criteria: Comments Prepared in Response to the April 19, 2018 Rulemaking Meeting. April 30, 2018.

¹¹ Idaho Department of Environmental Quality. 2020a. 2019 Arsenic Accumulation in Fish Tissue. Preliminary Monitoring Results. March.

¹² Idaho Department of Environmental Quality. 2020b. Revision of Idaho's Human Health Criteria for Arsenic. Docket No. 58-0102-1801. July 15, 2020. PowerPoint presentation by Jason Pappani.

¹³ This paper looks at a number of relationships including inorganic arsenic fish tissue concentrations vs. surface water total arsenic concentrations; and BAF vs. total arsenic concentration in surface water. No statistically significant relationships were found.

Table 7
Summary of As_(in) Surface Water/Fish Tissue Regression Analyses with Varying Treatment of Non-detects

Treatment of Non-Detects	Sample Size	Regression Equation	R ²	P-Value
Non-detects = Detection Limit	48	$y = 0.1845x + 1.5487$	0.013	0.44
Non-detects = 1/2 Detection Limit	48	$y = 0.1908x + 1.5069$	0.014	0.42
Non-detects Excluded	34	$y = 0.0854x + 2.3312$	0.003	0.77

Figure 4.
Plot of Paired Surface Water/Fish Tissue Data with Regression and Geometric BAFs Shown.

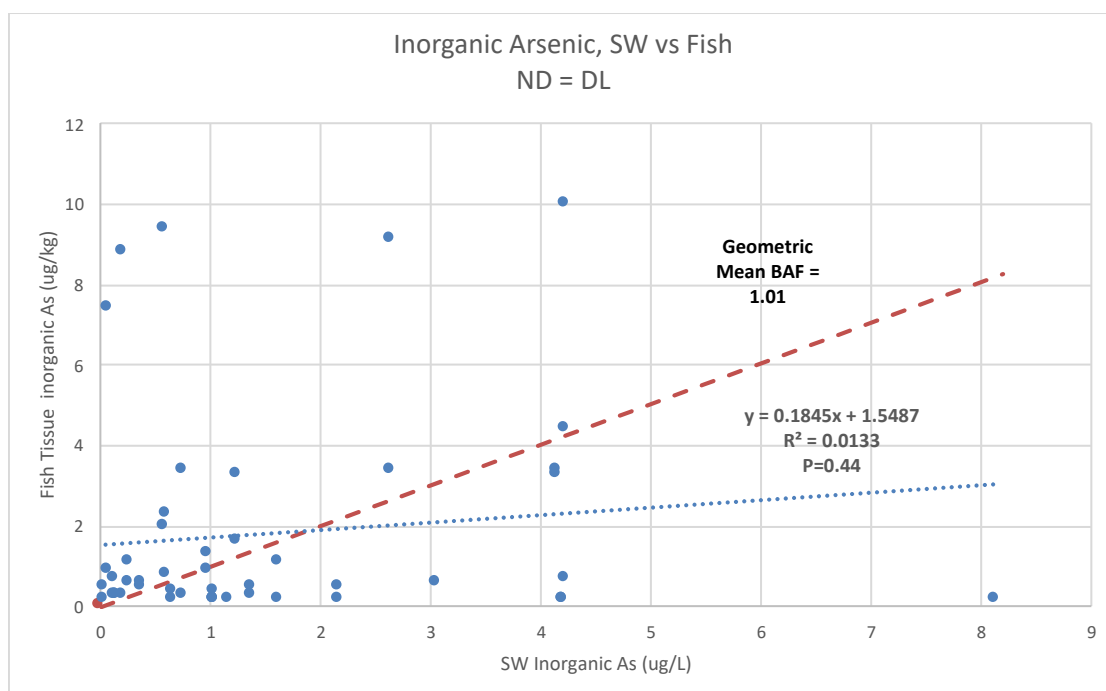


Figure 4 also presents a BAF derived using the geometric mean approach followed by the Department.¹⁴ The geometric mean BAF shown on Figure 4 is 1.01 L/kg, slightly smaller than the BAF of 1.18 L/kg presented by DEQ during the July 15 Rulemaking meeting.¹⁵ It does not represent a better “fit” to the 2019 dataset than any of numerous

¹⁴ Idaho Department of Environmental Quality. 2020b. See footnote number 10.

¹⁵ Parallel to the regression analyses, three alternative geometric mean BAFs were calculated; they varied based on the treatment of non-detect samples and duplicates. In all cases the average of surface water duplicates was used to represent the surface water concentration when estimating the BAF at a location because the differences in As_(in) surface water concentration were small. The relative percent

alternative lines that could be used to represent similarly derived BAFs. It under predicts inorganic arsenic tissue concentrations at low surface water concentrations and over predicts inorganic arsenic tissue concentrations at high surface water concentrations.

Thus, based on the state-wide 2019 dataset, the concentration of inorganic arsenic in fish tissue appears to be independent of the concentration of inorganic arsenic in surface water. As a result, a scientifically defensible BAF (defined as a BAF that can be used to predict fish tissue concentrations from a water concentration) cannot be established. That means in the “aggregate” regulating the inorganic arsenic concentration in surface water will not affect concentrations of inorganic arsenic in fish; for very specific site conditions such a relationship may exist but at this time a data set for such a site/conditions has not been found (developed). The state-wide data set shows that lower inorganic arsenic surface water concentrations do not lead to lower fish concentrations (and lower fish consumption exposures).¹⁶ Though it does not preclude the possibility of specific sites where such a relationship does exist.

2.C. Potential Risk of Inorganic Arsenic Concentrations in Fish

As noted above, the geographic breadth (i.e., targeted state-wide sampling) and large size (i.e., 172 individual fish divided into 48 composites samples) of the 2019 Idaho-wide fish dataset makes it unique and robust. It can be used to evaluate the potential for fish in Idaho surface waters to pose a potential risk to human health associated with consumption of Idaho fish containing inorganic arsenic. To derive human health water quality criteria for other substances, the Department has already identified the key assumptions necessary for deriving allowable concentrations of substances in surface water allowable fish tissue concentrations. Assuming a bodyweight of 80 kilograms, a fish consumption rate of 66.5 grams per day for a lifetime, an acceptable excess lifetime cancer risk of 1×10^{-5} , and using the current USEPA cancer slope factor of $1.5 \text{ (mg/kg-day)}^{-1}$ for arsenic, the allowable inorganic arsenic fish tissue concentration is 8 micrograms per kilogram ($\mu\text{g/kg}$)¹⁷.

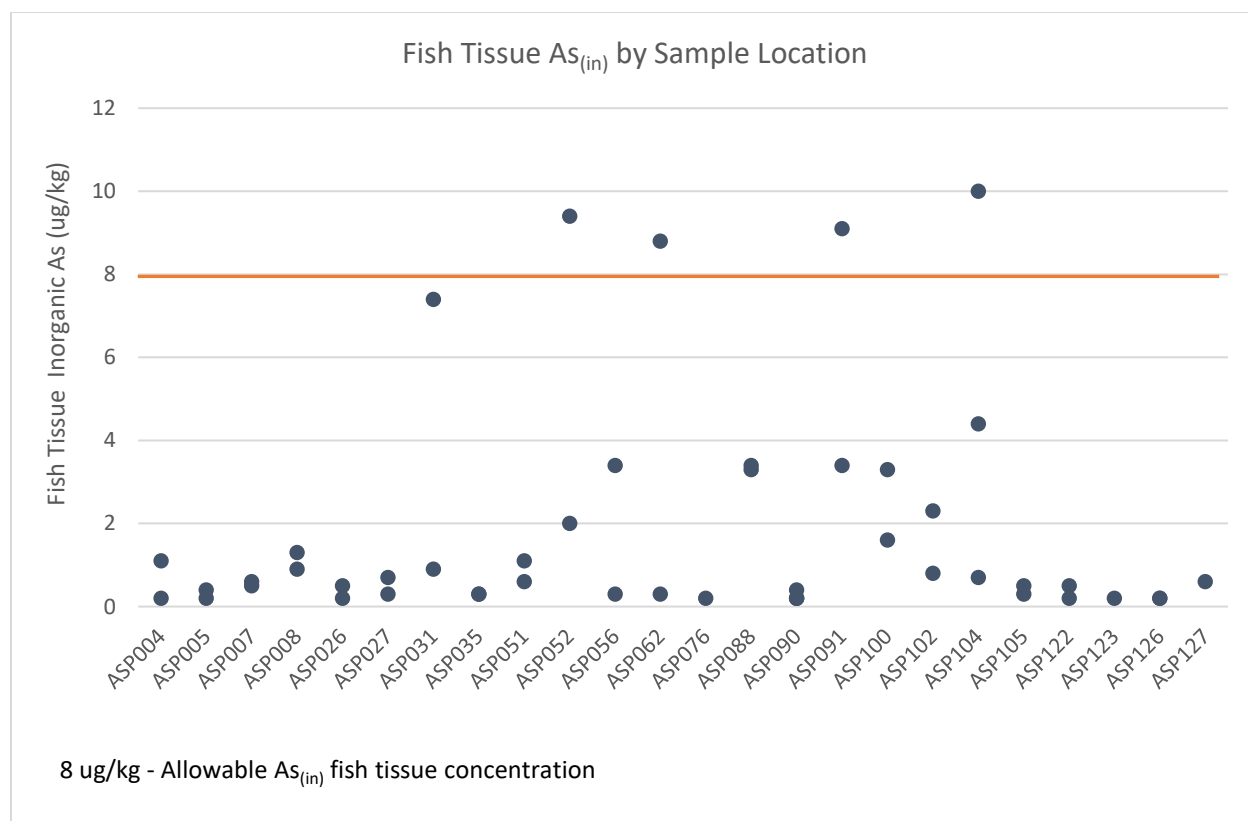
difference (RPD) of $\text{As}_{(\text{in})}$ concentrations at the two sampling locations with surface water duplicates was 0% and 7%. In all cases, fish duplicates were treated as separate samples, each with its own unique BAF because detected $\text{As}_{(\text{in})}$ concentrations varied substantially between fish tissue duplicate samples at two of three sampling stations with RPDs of 0%, 67%, and 78%. Depending upon whether non-detects were assumed to have $\text{As}_{(\text{in})}$ concentrations equal to the detection limit, equal to half the detection limit, or non-detects were eliminated from the calculation, the geometric mean BAFs were 1.01 L/kg, 0.86 L/kg, and 1.37 L/kg. All of these are similar to but not identical to the geometric mean BAF of 1.18 L/kg developed by the Department (see footnote number 10)

¹⁶ The same conclusions exist for inorganic arsenic in fish tissue and total arsenic concentrations in surface water. See Appendix C.

¹⁷ Allowable concentration ($\mu\text{g/kg}$) = (Allowable Risk (1×10^{-5}) x Bodyweight (80 kg/person)) ÷ (Fish consumption rate (0.0665 kg/person-day) x Cancer Slope Factor (1.5 kg-day/mg) x Conversion factor (1,000 $\mu\text{g}/1 \text{ mg}$) = 8 $\mu\text{g/kg}$. Use of an allowable risk of 1×10^{-4} would result in a higher allowable concentration in fish tissue.

Based on the Department's 2019 data, 44 of 48 composite fish samples had inorganic arsenic concentrations below an allowable fish tissue concentration of 8 µg/kg (Figure 5). Only four of 48 tissue samples had an inorganic arsenic concentration slightly (no more than 25%) greater than 8 µg/kg (Figure 5). Because the exceedances of the allowable concentration are small and infrequent, the potential excess lifetime cancer risk associated with all four of these samples is 1×10^{-5} . The comparison of measured inorganic As fish tissue concentrations to the allowable concentration indicates that potential excess lifetime cancer risks associated with daily consumption of fish from Idaho surface waters over a lifetime are at or below Idaho's allowable risk level and that the fish are safe to eat.

Figure 5
Plot of 2019 Fish Tissue Data by Sampling Location with 8 ug/kg As_(in) Allowable fish Tissue Concentration also Shown



3. Application of the Arsenic Best Science to the Water Quality Regulatory Framework

As described in the introduction, the designated beneficial uses for which the arsenic human health water quality criteria are being developed are: recreational (fish consumption exposures only); and recreational and domestic water supply (fish consumption and potable water exposures). Approximately 96,490 stream miles are designated or presumed to have recreational use only. Approximately 22,957 stream miles are currently designated for domestic water supply and recreational use.¹⁸ (IDEQ 2019)

Based on the finding that fish collected throughout Idaho have inorganic arsenic concentrations that are equal to or less than the allowable concentrations, water quality criteria derived to mitigate potential risks associated with fish consumption are not necessary given current concentrations. Moreover, given the absence of a biologically meaningful and statistically significant relationship between inorganic arsenic concentration in Idaho surface waters and fish tissue, the concept of a BAF is not applicable, and traditional numeric surface water-based water quality criteria that rely on a BAF is not defensible because requiring a lower inorganic arsenic surface water concentration won't lead to lower fish concentrations (and lower fish consumption exposures). If the inorganic arsenic concentration in fish tissue is determined to pose an unacceptable risk, exposure to such inorganic arsenic concentrations will need to be reduced through a mechanism other than numeric surface water quality criteria and dealt with on a site by site basis.

A mechanism by which to identify surface waters potentially needing evaluation of inorganic arsenic fish tissue concentrations is to use a water quality based value to trigger fish tissue sampling/monitoring. Though the basis for the surface water concentration that triggers the need for fish tissue monitoring could not rely on a relationship between fish tissue and water concentrations (i.e., a BAF) unless site-specific data justified such use.

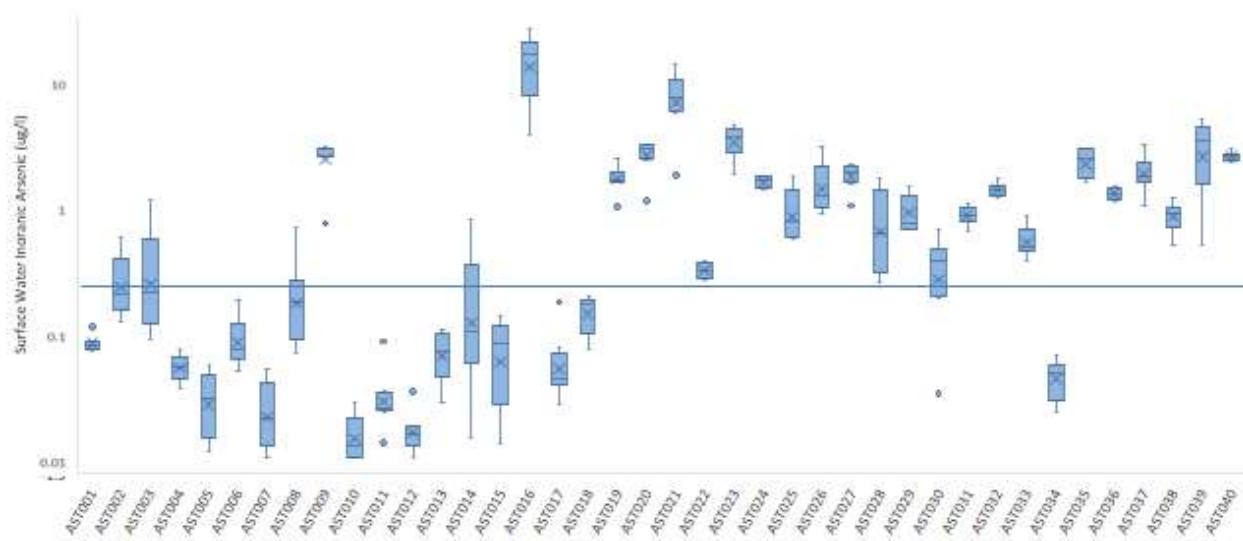
As demonstrated at the July 15, 2020 rulemaking meeting, if default Department and USEPA assumptions are used to derive potential human health water quality criteria protective of drinking water exposures, (e.g., 0.22 µg/L As_(in)), it can be lower than the arithmetic mean¹⁹ background inorganic arsenic concentrations in most Idaho surface waters monitored to date (Figure 6). Adoption and implementation of such potential water quality criteria creates numerous practical limitations, beyond the obvious

¹⁸ Idaho Department of Environmental Quality. 2019. Docket No. 58-0102-1801. Revision of Idaho's Human Health Criteria for Arsenic. Negotiated Rulemaking. PowerPoint presentation by Jason Pappani. July 23, 2019.

¹⁹ When comparing the receiving water concentration of a substance to a human health WQC based on chronic exposures, the arithmetic mean concentration, not the geometric or harmonic mean concentration, is the appropriate measure of central tendency to use in the comparison (Appendix E).

problem of promulgating an unattainable criteria. Two examples of such limitations are listed below.

Figure 6
August 2019 to May 2020 As_(in) Surface Water Monitoring Results Compared to Hypothetical As_(in) Human Health Water Quality Criteria



The first example consists of a hypothetical drinking water utility extracts groundwater with a natural occurring As_(in) concentration of 1 µg/L. That groundwater concentration is greater than a hypothetical drinking water of 0.22 As_(in) but meets the MCL of 10 µg/L As_(total). Because the inorganic arsenic concentration is less than the MCL, the utility is able to distribute the groundwater without treatment for the inorganic arsenic concentration as potable water to the community it serves. Following use of the water by the community, the water is collected by the wastewater utility serving that community. The water continues to have an inorganic arsenic concentration of 1 µg/L because the community did not add any inorganic arsenic to the water during use. If Idaho were to adopt a hypothetical human health water quality criteria of 0.22 µg/L As_(in), the wastewater utility might need to treat the water before discharging it to a surface water designated for drinking water use. Treatment might not be necessary if the As_(in) receiving water concentration is less than the human health water quality criteria but would likely be required if the As_(in) receiving water concentration is greater than the human health water quality criteria. In the first case where the background concentration in the receiving water is less than the human health water quality criteria, as long as the concentration of the receiving water remains below the water quality criteria following release of the wastewater utility's effluent, treatment would not be required. However, in the second case, where the As_(in) background concentration in the receiving water exceeds the human health water quality criteria, treatment would likely be required such that the As_(in) concentration in the receiving water does not exceed the naturally occurring As_(in) concentration. Given the state-wide monitoring data collected to date, about two thirds of Idaho rivers will have a naturally occurring

As_(in) background concentration higher than the hypothetical human health criteria used in this example.

The second hypothetical example of the practical implications of a human health water quality criteria that is lower than naturally occurring background inorganic arsenic concentrations consists of a drinking water utility that uses the receiving water as the source of potable water. The naturally occurring inorganic arsenic concentration in the receiving water is 1 µg/L. As in the above scenario, the drinking water utility can distribute that as potable water without treatment for arsenic because it meets the MCL of 10 µg/L As_(inl). However, if consideration of naturally occurring background is not allowed, the wastewater utility will likely need to treat that water before discharging it because it exceeds the human health water quality criteria by nearly 10-fold. Because Idaho rules do allow use of naturally occurring background as the human health water quality criteria when the background concentration is higher than the human health water quality criteria, it may be possible for the wastewater utility to discharge its effluent without treatment. This assumes that the use of the water by the community did not add a measurable amount of arsenic to the wastewater. If the community were to add a measurable amount of arsenic to the wastewater stream, even if that amount is very small (e.g., 0.1 µg/L As_(in), or 10% of the background), the wastewater utility would need to treat the water such that the receiving water does not exceed the natural background of 1 µg/L As_(in).

Beyond the issue of community use of the water potentially causing a small increase in the inorganic arsenic concentration that would necessitate potentially expensive treatment, as the DEQ targeted monitoring data show, naturally occurring background concentration varies. Given that variation, establishing naturally occurring background on a site-specific basis has the potential to be a resource intensive process. Further, given that variation, a background-based human health water quality criteria would also need to have in place a process for determining whether an exceedance of naturally occurring background is the result of an addition by the community of inorganic arsenic to the wastewater stream or is simply, natural variation, unless the hypothetical inorganic arsenic human health water quality criteria allowed for a nominal exceedance of background.

Finally, from a public policy standpoint, the hypothetical drinking water criteria of 0.22 µg/L As_(in) makes no sense in Idaho. According to the Department's website approximately 95% of Idaho's population obtain their drinking water from groundwater. Both the Department and EPA have determined that it is safe for Idaho citizens to consume drinking water with a concentration of arsenic that does not exceed 10 µg/L but presumably for the small percentage of people which consume their drinking water from surface water, the criteria must be orders of magnitude more stringent. Such an approach makes no sense even if EPA Guidance suggests such an irrational result.

4. Options for Establishing a New Human Health Arsenic Water Quality Criterion

This section presents two potential human health water quality options for waters whose designated use is recreation only (Table 8) and four potential options for whose designated use is water supply and recreation use (Table 9). Given that 2019 data indicate a statistically significant and biologically meaningful BAF is not applicable to surface waters and fish in Idaho, none of the options discussed below include use of a BAF to establish human health water quality criteria.

4.A. Recreational Use

- 1.) Fish tissue based human health “water quality” criterion of 8 µg/kg As_(in) with no numeric surface water value. The criterion value is based on the current IRIS CSF of 1.5 kg-day/mg, 1x10⁻⁵ allowable risk, and DEQ fish consumption rate (66.5 g/d) and bodyweight (80 kg).

Table 8
Summary of Recreation Use Only Human Health Water Quality Criteria Options

Option	Description	Criteria	Number of Stations/Samples Exceeding
1	Numeric Fish Tissue Value as the Water Quality Criteria	8 µg/kg As _(in)	4 of 48 tissue samples
2	Narrative Criteria: Numeric Fish Tissue Value as the Water Quality Criteria with a Surface Water Screening Value	8 µg/kg As _(in) 2.2 µg/L As _(in) is a “screening” value for triggering fish tissue monitoring	11 of 40 monitoring stations would initiate fish tissue testing.

Note:

For all recreational use only options presented in the Table 8, only an exceedance of the allowable fish tissue concentrations of 8 µg/kg can be used to demonstrate that the designated recreational use only is not being attained.

- 2.) A numeric surface water concentration of 2.2 µg/L As_(in) is used as a screening value to initiate fish tissue sampling to determine if the inorganic arsenic fish tissue concentrations are above the tissue criterion value of 8 µg/kg As_(in). The surface water screening concentration is derived using the assumptions the Department uses to derive human health water quality criteria for other substances in surface water but does not include the fish consumption contribution, the current USEPA cancer slope factor for arsenic and a 1x10⁻⁴ allowable risk level. As shown in Figure 4, the majority of the inorganic arsenic concentrations measured in fish tissue were less than 2 µg/kg and result in minimal exposure to inorganic arsenic compared to assumed surface water exposures. The water quality criterion should be clear that exceeding the 2.2 µg/L As_(in) is not an exceedance of the water quality criterion (i.e., does not demonstrate impairment of the recreational only designated use). An exceedance in the surface water of the 2.2 µg/L As_(in) concentration value only initiates fish tissue sampling to determine if the fish tissue criterion concentration

of 8 µg/kg is exceeded. If 8 µg/kg As (inorganic) is not exceeded, then the waterbody is not impaired for recreational use and water quality based effluent limits for arsenic_(in) would not be required to protect human health.

4.B. Recreational and Drinking Water Use

1.) Numeric surface water human health water quality criterion of 0.22 µg/L As_(in). This is the hypothetical criterion value presented by the Department at the July 15, 2020 rulemaking meeting. This value is derived using the assumptions and allowable risk level that the Department uses to derive human health water quality criteria for other substances in surface water but does not include the fish consumption contribution. This assumes that the majority of the inorganic arsenic exposure would come from ingestion of surface water and not from fish consumption.²⁰ As shown in Figure 4, the majority of the inorganic arsenic concentrations measured in fish tissue were less than 2 µg/kg. The arithmetic mean background concentration of inorganic arsenic in surface water for 29 of 40 monitoring stations in the targeted sampling program (8/2019-5/2020 data) exceeds the value of 0.22 µg/L.

Table 9
Summary of Water Supply and Recreation Use Human Health Water Quality Criteria Options

Option	Description	Criteria	Number of Stations Exceeding
1	Numeric Surface Water Criteria	0.22 µg/L As _(in)	29 of 40 monitoring stations
2	Numeric Surface Water Criteria	2.2 µg/L As _(in)	11 of 40 monitoring stations
3	Numeric Surface Water Criteria	2.2 µg/L As _(in) – 10 µg/L As _(in)	1 to 11 of 40 monitoring stations
4	Numeric Surface Water Criteria	10 µg/L As _(in)	1 of 40 monitoring stations

2.) Numeric surface water criterion of 2.2 µg/L As_(in). This hypothetical criterion is derived using the same exposure and toxicity assumptions as used to derive the 0.22 hypothetical criterion value combined with an allowable excess life cancer risk level of 1x10⁻⁴. As with Option 1, this option assumes that the majority of the inorganic arsenic exposure would come from ingestion of surface water and not from fish consumption. This allowable cancer risk level is within

²⁰ As discussed above, a scientifically based BAF is not supported by the most recent paired fish tissue and surface water data collected by the Department. An alternative human health water quality criterion can be derived by using the assumptions and allowable risk level that the Department uses to derive human health water quality criteria for other substances in surface water but excluding the fish consumption rate and BAF assumptions. When those two assumptions are excluded, the inorganic As human health water quality criterion is 0.22 µg/L, the same value as when fish consumption and the BAF of 1.18 L/kg is included. Including or excluding fish consumption when the BAF is small, has little effect on the water quality criterion. This numeric criterion of 0.22 µg/L is derived without inclusion of fish consumption because the inorganic As concentration in fish is not affected by the inorganic As concentration in water.

the range of allowable cancer risk associated with MCLs. It is also the same allowable risk level approved by US EPA for Oregon's water and organism human health water quality criteria. The arithmetic mean background concentration of As_(in) in 11 of 40 monthly monitored surface waters exceeds 2.2 µg/L (based on 8/2019-5/2020 data).

3.) Numeric surface water criterion of 2.2 µg/L As_(in) to 10 µg/L As_(in) to account for naturally high concentrations of arsenic in surface and ground waters. This criteria option is based on a range of arsenic water column concentrations, from the larger of either 2.2 µg/L As_(in) or background, to 10 µg/L As_(in). As with Option 1, this option assumes that the majority of the inorganic arsenic exposure would come from ingestion of surface water and not from fish consumption. When background is less than 2.2 µg/L As_(in), the first concentration of 2.2 µg/L As_(in) represents a strictly health-based criterion, based on the Department's established methodology for human health water quality criteria and assuming an allowable lifetime cancer risk level of 1x10⁻⁴. When background is greater than 2.2 µg/L As_(in) the first number in the range is the background concentration and that value represents the criteria as established by Idaho rules when the criteria are less than background. The second number in the range is the MCL, (established under the federal Safe Drinking Water Act) that has been determined to be an acceptable concentration of As_(in) as raw water for public water supplies, taking treatability and laboratory detection limits into account. Control requirements, such as discharge permit effluent limitations, shall be established using the first number in the range as the *ambient water quality target*, provided that no effluent limitation shall require an "end-of-pipe" discharge concentration more restrictive than the second number in the range. Water bodies will be considered in attainment of this standard, and not included on the Section 303(d) List, so long as the existing ambient quality does not exceed the second number in the range or naturally occurring background, whichever is greater.

4.) Numeric surface water criterion of 10 µg/L As_(in). This is equal to the MCL of 10 µg/L As_(in) as established by the Safe Drinking Water Act. It represents a concentration of arsenic in domestic drinking water that USEPA has determined is safe. Its adoption as the water and organism human health water quality criterion is not precedent setting in any way as 16 other states use the MCL of 10 µg/L As_(in) as their water and organism human health water quality criteria. Thirteen other states have a domestic water supply designated beneficial use and use the MCL of 10 µg/L As_(in) as the human health water quality criteria for those water bodies. [See Tables 4 and 5.]

An adoption of the arsenic MCL as the human health water quality criteria would also meet Idaho's mixing zone provisions. Idaho allows mixing zones where the criteria may be exceeded in accordance with the terms of the mixing zone allowance, but (per IDAPA 58.02.060) the MCL is the criteria that must be met at

the point of a drinking water system intake where treatment is presumed to occur.

“Mixing zones, individually or in combination with other mixing zones, shall not cause unreasonable interference with, or danger to, beneficial uses. Unreasonable interference with, or danger to, beneficial uses includes, but is not limited to, the following: Concentrations of pollutants that exceed Maximum Contaminant Levels at drinking water intake structures.”

As discussed in Section 1.B. of these comments, one of the reasons given in the complaint filed by NWEA of why EPA’s approval of the 10 µg/L As_(in) value as the human health criteria was invalid is that MCL values cannot be used as CWA human health water quality criteria per EPA guidance. EPA Region X, in reaching a settlement with NWEA agreed with that reason.²¹ However, it is not clear that EPA’s use of guidance as regulation is truly legal. Recent Executive Orders have been issued to address the use of “guidance” documents by agencies as regulations.²² Moreover, it appears the main reason for this guidance/recommendation is that human health criteria for surface water need to consider not only drinking water consumption but “fish consumption and bioaccumulation”.²³ As the Department’s robust data set collected since EPA’s disapproval has demonstrated, in the “aggregate” bioaccumulation and fish consumption are not influenced by inorganic arsenic concentrations in surface water. Concentrations of inorganic arsenic in fish tissue are most often below 2 µg/kg. Therefore, the incorporation of the 10 µg/L arsenic criteria still warrants serious discussion as the majority of the inorganic arsenic ingestion would come from surface water.

5. Recommendation & Implementation

Federal regulations require that water quality criteria be based upon the following:²⁴

- (1) Establish numerical values based on:
 - (i) 304(a) Guidance or
 - (ii) 304(a) Guidance modified to reflect site-specific conditions; or
 - (iii) Other scientifically based defensible methods;

²¹ During the Department’s July 15, 2020 negotiated rulemaking meeting, EPA staff from headquarters and Region X restated this position.

²² See the following Executive Orders issued on October 9, 2019: Executive Order on Promoting the Rule of Law Through Improved Agency Guidance Documents and Executive Order on Promoting the Rule of Law Through Transparency and Fairness in Civil Administrative Enforcement and Adjudication.

²³ See 65 Fed. Reg. 66444,66450.

²⁴ 40 CFR § 131.11.(b).

(2) Establish narrative criteria or criteria based upon biomonitoring methods where numerical criteria cannot be established or to supplement numerical criteria.

As noted earlier in these comments, the 304(a) Guidance values do not reflect naturally occurring concentrations of arsenic in Idaho surface waters. Thus, any proposed criteria needs to (a) reflect site-specific conditions, (b) be based on scientifically defensible methods, or (c) be a narrative criteria that can utilize biomonitoring or supplemental numeral criteria. Based on the review and careful consideration of the robust and numerous available data from Idaho, the naturally occurring elevated concentrations of arsenic in Idaho surface waters, the following human health criteria are recommended.

5.A. Recommendation

Recreation Use

For waters designated for recreation use only, the recommended human health water quality criteria is a fish tissue concentration of 8 µg/kg As_(in) with a screening water quality value of 2.2 µg/L As_(in). The water column concentration of 2.2 µg/L is used as a screening value to determine if fish tissue monitoring is necessary in a water body. A water body with an inorganic arsenic concentration equal to or less than 2.2 µg/L will be considered to be in attainment of the recreational only designated use and fish tissue monitoring would not be required. Fish tissue monitoring would need to be undertaken in a water body with a water column inorganic arsenic concentration greater than 2.2 µg/L to determine if the water body attains the recreational only designated use. A water body with fish tissue concentrations equal to or less than the allowable fish tissue concentration of 8 µg/kg inorganic arsenic will be considered to be in attainment of the recreational only designated use.

This recommendation utilizes 304(a) guidance methodology for the calculation of human health water quality standards along with a narrative standard that incorporates biomonitoring.

Water Supply and Recreation Uses

For waters designated for water supply and recreation use, the recommended human health water quality criteria is based on a range of arsenic water column concentrations, where the low end of the range is the larger of either 2.2 µg/L As_(in) or background (inorganic), and the high end of the range is 10 µg/L As_(in). When the background concentration is less than 2.2 µg/L As_(in), the low end of the range is 2.2 µg/L As_(in) and represents a strictly health-based criterion. When background is greater than 2.2 µg/L As_(in), the low end of the range is equal to the background concentration. The high end of the range is equal to the Maximum Contaminant Level, a concentration established under the federal Safe Drinking Water Act that has been determined to be an acceptable level of As_(in) as raw water for public water supplies, taking treatability and laboratory detection limits into account.

Control requirements, such as discharge permit effluent limitations, shall be established using the low end of the range as the ambient water quality target, provided that no effluent limitation shall require an “end-of-pipe” discharge level more restrictive than the high end of the range. A water body will be considered in attainment of the domestic water supply and recreational designated use, so long as the existing ambient quality does not exceed the arsenic (total) concentration at the high end of range or background, whichever is greater.

This proposed criterion utilizes 304(a) guidance methodology for the calculation of a human health value and incorporates Idaho specific water quality conditions (high naturally occurring arsenic concentrations in surface and ground water) as a background adjustment per 40 CFR § 131.11(b)(ii and iii). *Also, it uses Idaho specific data that show on the aggregate there is not a relationship between surface water arsenic concentrations (both total arsenic and inorganic arsenic) and inorganic arsenic concentrations in fish tissue.* Furthermore, the extensive data set shows that the majority of the inorganic arsenic fish tissue concentrations are non-detect or below 2 µg/kg. Thus, this proposed criterion assumes that the majority of the inorganic arsenic exposure would come from ingestion of surface water and not from fish consumption. The use of the 10 µg/L value will not cause any waters designated as a drinking water supply to exceed the MCL value nor conflict with existing Water Quality Rules such as for mixing zones. Collectively, the use of Idaho specific surface water arsenic and fish tissue data to derive arsenic human health water quality criterion is appropriate as a “scientifically defensible method.”

5.B. Implementation

Idaho’s water quality rules also have several “implementation tools” that might be of assistance to the regulated community in the implementation of any new arsenic criteria. Potential tools include variances, intake credits, use attainability analysis and site-specific criteria. Of these tools, use attainability analysis offers the most practicable regulatory method to the regulated community.

Variances would potentially be problematic. A variance (unless specifically described in the rules) would need to be re-issued in conjunction with a discharge permit renewal, which is typically every five (5) years. Because it is unlikely that arsenic concentrations in a receiving water would have changed during the term of a permit, the variance process would need to be repeated for every five (5) year permit renewal cycle. This repeated reissuance of variances is not practical.

Intake credits, while helpful for discharges using the receiving water as a source water, may not be much help to dischargers who are using groundwater with naturally elevated groundwater concentrations as a source water. Naturally occurring arsenic concentrations in groundwater throughout much of Idaho exceed many of the possible

domestic water supply human health water quality criteria that have been presented by the Department to date.

Natural background is recognized as a site-specific human health water quality criteria when natural background exceeds a numeric health based water quality criteria. However, as described by the second hypothetical example in the Application of Science section above, more specific implementation tools will need to be developed. At a minimum such tools would need to describe practical methods to establish site-specific background, take into account variability of naturally occurring concentrations, and allow for some de minimis increase in receiving water concentration downstream of the discharge.

The Use Attainability Analysis (UAA) process or development of a site-specific criteria (SSC) could also be utilized to revise the designated uses or criteria being applied to a specific water to more accurately reflect site conditions or account for elevated background concentrations in criteria. However, conducting a UAA or developing an SSC are time and data intensive processes ultimately requiring formal legislative and USEPA approval. These approaches are also impractical for application on a broad geographic scale. A streamlined or less intensive UAA or SSC development could be considered as part of implementation guidance to allow for consideration of site-specific conditions in application of criteria.

Idaho water quality rules already use fish tissue values as water quality criteria for two other pollutants (methyl mercury and selenium). Further procedures would need to be developed on how biomonitoring results are used to set discharge limits; though the recommended criteria do provide surface water concentrations that can be the starting place in regards to limits and monitoring that is needed.