

Arsenic Guidance Document Development



STATE OF IDAHO
DEPARTMENT OF
ENVIRONMENTAL QUALITY

Agenda

- Introductions.
- Background on arsenic.
- Pending Rule.
- Possible outline.
- Implementation considerations.
- Next steps and possible timeline.



Human Health

Recreation

Domestic Water Supply

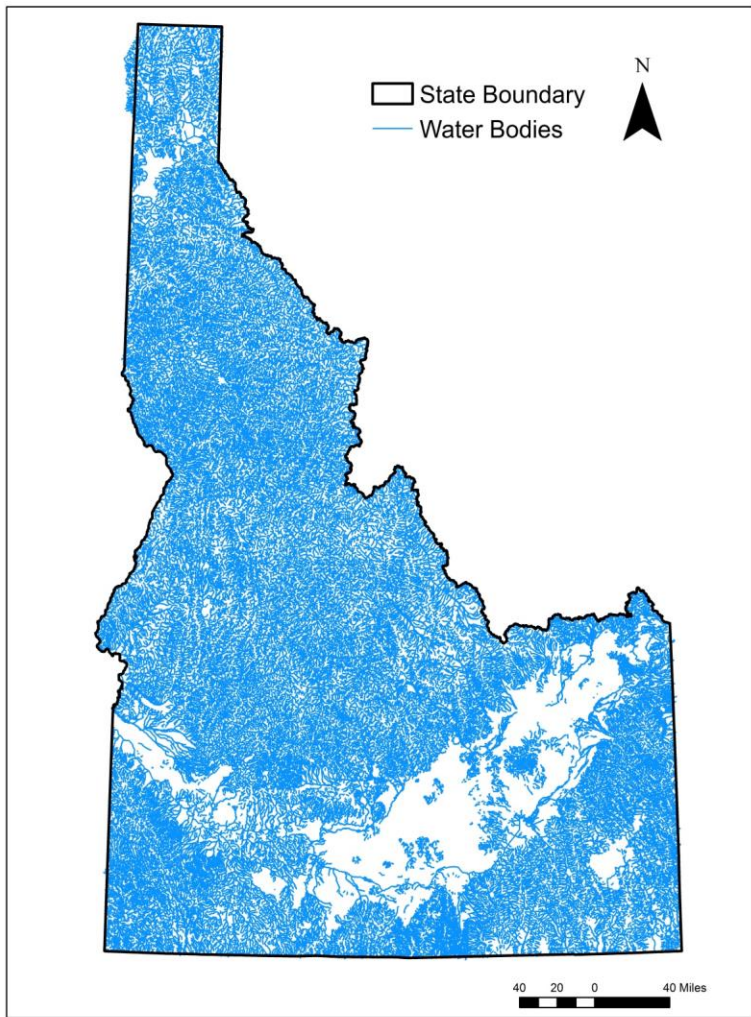
Fish Only

Fish + Water



+



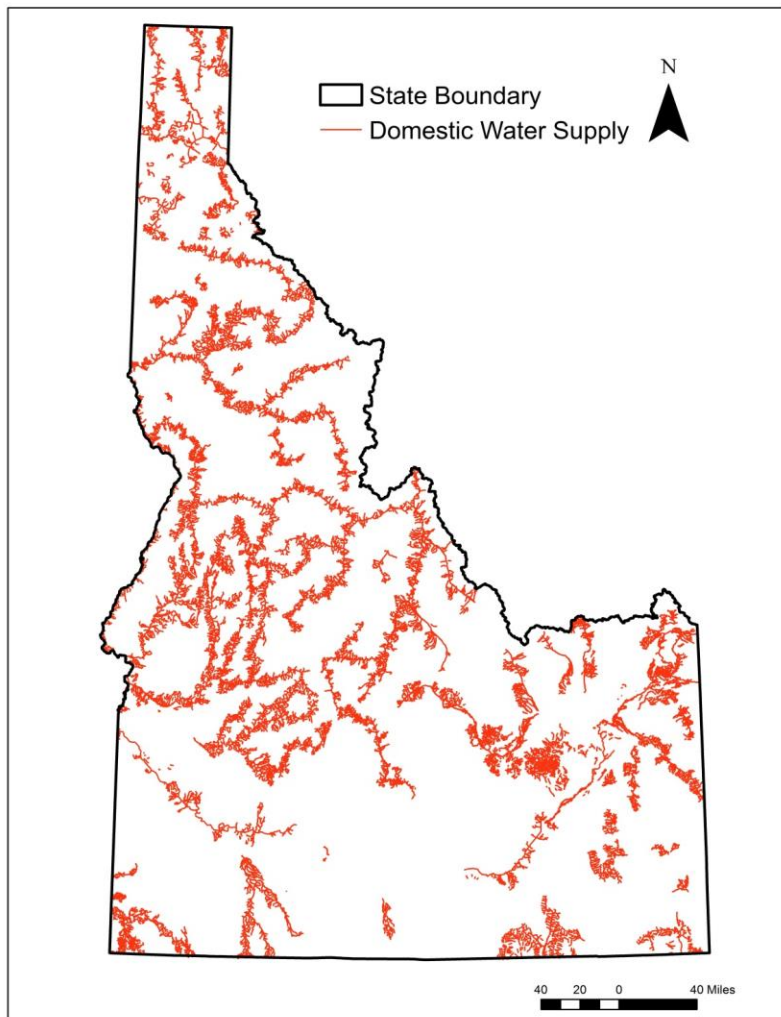


~96,490 stream miles
designated or presumed for
Recreation Uses (Fish Only
criteria)

Recreation

Fish Only





~22,957 miles currently designated for Domestic Water Supply (Fish + Water Criteria)

Domestic Water Supply

Fish + Water



+





History of Arsenic Criteria in Idaho

History of Arsenic Criteria in Idaho

Revisions to Idaho's arsenic human health criteria

| | 1992 | 1995 | 1999 | 2010 | 2016 | 2018 | 2022 |
|-----------------------|----------------------|---------------|------------------|--------------------------|---------------------------------|----------------------------|-------------------------------------|
| | National Toxics Rule | Idaho Revises | Idaho Adopts MCL | Idaho Revises to New MCL | EPA Reconsiders and Disapproves | Idaho Initiates Rulemaking | Idaho Board Adoption |
| Water and Fish (µg/L) | 0.018 | 0.02 | 50 | 10 | 10 | Under Development | 10 |
| Fish Only (µg/L) | 0.14 | 6.2 | 50 | 10 | 10 | Under Development | Fish tissue 8.0 Water column 4.3 |



Summary of pending rule

Summary

- Fish Only Criteria has two elements: fish tissue criterion of 8.0 $\mu\text{g}/\text{kg}$ and water column criterion of 4.3 $\mu\text{g}/\text{L}$, derived from Idaho-specific exposure factors to protect human health and recreational use in Idaho.
- Fish tissue element supersedes water column; fish tissue element translates to water column target using site specific bioaccumulation data.
- For Fish and Water Criteria, the fish tissue criterion must also be met, and if sufficient fish tissue data is not available, the water column criterion on 4.3 $\mu\text{g}/\text{L}$ would apply.

Lessons Learned

- Important to utilize analytical methods that provide sufficient detection limits to quantify inorganic arsenic in tissue.
- Target fish tissue samples from resident gamefish species or other commonly consumed fish.
- Base translation of the fish tissue criterion to a water column value on the geometric mean BAF from paired tissue and water samples from gamefish species present at a given site.
- Unlike mercury and selenium, inorganic arsenic is not highly bioaccumulative in fish.
- Stakeholder engagement and participation throughout the process is important.



Pending Rule

Pending Rule

b. Table 2 contains criteria *set for to protection 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. *(SineDie22)(_____)*

| Table 2. Criteria for Protection of Human Health (based on consumption of:) | | | | | | |
|---|-----------------|-------------|---|-----|---|-----------------|
| Compound | a CAS Number | Carcinogen? | Water & Fish (µg/L <u>unless otherwise specified</u>) | | Fish Only (µg/L <u>unless otherwise specified</u>) | |
| Inorganic Compounds/Metals | | | | | | |
| <u>¹Effective for CWA purposes. Water & Fish value, Fish Only value, and footnotes continue to be effective for CWA purposes until the date EPA issues written notification that the revisions in Docket No. 58-0102-2201 have been approved. See Arsenic² immediately below.</u> | | | | | | |
| Arsenic ² | 7440382 | Y | 10 | cdj | 4.3; <u>8.0 µg/kg</u> <u>fish tissue</u> | cdjk |

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

Fish Tissue ($\mu\text{g}/\text{kg}$ wet-weight)

Water Column ($\mu\text{g}/\text{L}$)

8.0¹

4.3²

¹Fish tissue element is based on total recoverable inorganic arsenic in muscle or fillet. When sufficient fish tissue data are available and there are no new or increasing point source discharges of arsenic, the fish tissue element supersedes the water column element provided at least ninety (90) days have passed since any new activity or discharge has occurred within the water body. Fish tissue element will be applied in accordance with Subsection 210.03.e.

²Water column element is based on dissolved inorganic arsenic in water.

Footnote k is not effective for CWA purposes until the date EPA issues written notification that the revisions in Docket No. 58-0102-2201 have been approved.

e. Application of the fish tissue element of the arsenic criterion for human health. ()

i. The fish tissue element for total recoverable inorganic arsenic is based on a single measurement using sufficiently sensitive methods. ()

ii. The single measurement must be made on a sample that is an average or composite of a minimum of five (5) individual fish of the same species, ~~game fish when present~~, collected from the same water body within the same calendar year. When available, game fish species representative of the size and species that may be legally harvested within the waterbody are preferred. Results from multiple sample events may be averaged or composited provided they represent the same species collected from the same water body within the same calendar year. ()

iii. Not to be exceeded; the Department will evaluate all representative fish tissue data to determine compliance with this criterion element. ()

iv. For purposes of determining water column targets for the development of effluent limits, TMDL targets, or water column targets for fishless waters, ~~T~~the fish tissue element may be translated to a water column value using a site-specific bioaccumulation factor (BAF) based on the ratio of total recoverable inorganic arsenic in fish muscle or fillet tissue to dissolved inorganic arsenic in the water column using the following equation:

$$WC_T (\mu g/L) = \frac{8.00 \mu g/kg}{BAF_{SS} L/kg}$$

Where:

$WC_T (\mu g/L)$ is the translated water column value; and

$BAF_{SS} L/kg$ is the site specific BAF calculated consistent with 210.03.e.v.

In fishless waters, surface water ~~from the fishless waters~~ and fish tissue from the immediate downstream waters may be used for bioaccumulation modeling. In the absence of sufficient fish tissue data, the water column element is the applicable criterion element in fishless waters. ()

v. When translating the fish tissue element to a water column value, the following procedures will be followed. ()

(1) Data used to translate the fish tissue element must be based on current conditions and consistent with Subsections 210.03.e.i. and ii. ()

(2) ~~Whenever practical, fish tissue samples must be representative of the game fish species present within the waterbody and include game fish species whenever practical of legally harvestable size.~~ In the absence of suitable game fish species, other resident fish species may be used. ()

(3) Water column samples must be representative of the annual average concentration of dissolved inorganic arsenic at the site. ()

(4) BAFs are calculated as a trophic-level weighted BAF or other scientifically defensible method for deriving protective BAF. ()

Subsection 210.03.e. is not effective for CWA purposes until the date EPA issues written notification that the revisions in Docket No. 58-0102-2201 have been approved.

Proposed Outline

- **Executive Summary**
- **Introduction**
 - Purpose
 - Sources of Arsenic in the Environment
 - *Species of Arsenic*
 - *Effects of Physical and Chemical Properties on the Toxicology of Arsenic*
 - *Background Arsenic Levels in Idaho*
 - Effects of Arsenic on Human Health
 - Bioaccumulation of Inorganic Arsenic in Fish
 - *Mode of Action and Toxicity of Inorganic Arsenic to Fish*
 - *Relationship of Water-to-Fish Tissue and Inorganic Arsenic*
- **Human Health Criteria for Arsenic**
 - Water and Fish
 - *Fish Tissue*
 - *Water Column*
 - Fish Only
 - *Fish Tissue*
 - *Water Column*
 - *Water Column Translation*
 - Bioaccumulation Factor Approach
 - *Trophic Level Weighted BAF*

Proposed Outline- Continued

- **General Implementation for Human Health Criteria**
 - Fish-Tissue Monitoring and Assessment
 - *Recommended Species*
 - *Sampling Assessment*
 - *Spatial Considerations*
 - *Temporal Considerations*
- **Fishless Waters**
 - Fishless Stream Translation
- **Identifying Impairments for Integrated Report**
- **Application of Criterion in Idaho Pollutant Discharge Elimination System Permits**
- **Application of Criterion in TMDL**

Implementation Considerations

- New activity
- Water body
- Immediate downstream
- Current conditions
- Annual average concentration
- Scientifically defensible

Next Steps

- Comments to DEQ on the outline
 - November 30
- Skeleton Draft to the group
 - Mid January
 - Comments due to DEQ by February
- Working group meetings for first and second drafts between February through June.
- Final draft out for 30-day public review early July.
- Address comments and submit to EPA Early fall 2023.



Thank you.

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