Idaho Department of Environmental Quality

Revision of Idaho’s Human Health Criteria for Arsenic
Docket No. 58-0102-1801
November 5, 2020

Jason Pappani
Outline

• Rulemaking Review
• Monitoring Update
• Criteria Options
• Next Steps
• Questions/Discussion
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</thead>
<tbody>
<tr>
<td>Action</td>
<td>National Toxics Rule</td>
<td>Idaho Revises</td>
<td>Idaho Adopts MCL</td>
<td>Idaho Revises to new MCL</td>
<td>EPA reconsiders, disapproves</td>
<td>Idaho initiates rulemaking, EPA and NWEA modify consent decree</td>
<td>New state or Federal Criteria</td>
</tr>
</tbody>
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**Idaho Department of Environmental Quality**
Monitoring

• Probabilistic Arsenic Accumulation in Fish
• Targeted Ambient in Water
Probabilistic As Accumulation

- 24 Sites
- Arsenic in fish and water
Bioaccumulation Factor for Inorganic As

- Geometric Mean
  \[ BAF = 1.12 \text{ L/kg} \]

![Graph showing relationship between water column iAs (µg/L) and fish tissue iAs (µg/kg)]

\[ BAF = \frac{[As_{fish}]}{[As_{water}]} \]

\[ y = 0.1802x + 1.5901 \]
\[ R^2 = 0.0116 \]
## Fall 2019 vs. Spring 2020

<table>
<thead>
<tr>
<th></th>
<th>Absolute Difference (µg/L)</th>
<th>Relative Percent Difference (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Min</td>
<td>0.00</td>
<td>0</td>
</tr>
<tr>
<td>25&lt;sup&gt;th&lt;/sup&gt; %ile</td>
<td>0.008</td>
<td>9</td>
</tr>
<tr>
<td>Average</td>
<td>0.38</td>
<td>33</td>
</tr>
<tr>
<td>Median</td>
<td>0.19</td>
<td>24</td>
</tr>
<tr>
<td>Geomean*</td>
<td>0.17</td>
<td>21</td>
</tr>
<tr>
<td>75&lt;sup&gt;th&lt;/sup&gt; %ile</td>
<td>0.631</td>
<td>58</td>
</tr>
<tr>
<td>Max</td>
<td>2.04</td>
<td>96</td>
</tr>
</tbody>
</table>

* RD = \frac{|R1 - R2|}{\frac{R1 + R2}{2}} \times 100
Targeted Ambient Arsenic

- ~Monthly (2019)
- Quarterly (2020)
- Accessible
Monitoring Results - Targeted

Harmonic Mean Concentration of monthly samples from August 2019 – August 2020
Human Health

Recreation

Fish Only

Domestic Water Supply

Fish + Water

Idaho Department of Environmental Quality
Idaho HHC Exposure Factors

\[ AWQC = RSD \times \left( \frac{BW}{DI + (FI \times BAF)} \right) \]

\[ RSD = \frac{Cancer Risk Factor \ (1 \times 10^{-5})}{Cancer Potency Factor \ (1.5 \ (mg/kg \ day)^{-1})} \]

BW = Body Weight; 80 kg
DI = Drinking Water Intake; 2.4 L/day
FI = Fish Intake; 0.0665 kg/day
BAF = 1.12 L/kg
Criterion Options – Fish Only (Recreation Use)

1. Calculate criteria based on Idaho exposure factors and Idaho specific BAF
2. Calculate fish-tissue based criterion
3. Water column screening
4. Hierarchical criterion – fish tissue element supersedes water column
1. Calculate criteria based on Idaho exposure factors and Idaho specific BAF

\[ F\text{ only} = \left( \frac{(1 \times 10^{-5})}{1.5 \text{ (mg/kg day)}^{-1}} \right) \times \left( \frac{80 \text{ kg}}{(0.0665 \text{ kg/day} \times 1.12 \text{ L/kg})} \right) \]

**Bioaccumulation Factor for Inorganic As**

- Geometric Mean BAF = 1.12 L/kg

\[ WQC = 7.16 \, \mu\text{g/L} \]
1. Calculate criteria based on Idaho exposure factors and Idaho specific BAF

\[
F_{\text{only}} = \left( \frac{1 \times 10^{-5}}{1.5 \text{ (mg/kg day)}^{-1}} \right) \times \left( \frac{80 \text{ kg}}{0.0665 \text{ kg/day} \times 1.12 \text{ L/kg}} \right)
\]

\[WQC = 7.16 \mu g/L\]
2. Calculate fish-tissue based criterion

Fish tissue criteria

\[
\text{Fish tissue criterion} = \left( \frac{1 \times 10^{-5}}{1.5 \text{ (mg/kg day)}^{-1}} \right) \times \left( \frac{80 \text{ kg}}{0.0665 \text{ kg/day} \times 1.12 \text{ L/kg}} \right)
\]

\[
\text{Fish tissue criteria} = 8 \mu g/\text{kg}
\]
3. Water column screening

- Water column screening = 7.16 µg/L
- Fish Tissue criterion = 8 µg/kg
4. Hierarchical criterion – fish tissue element supersedes water column

- Water column element = 7.16 µg/L
- Fish Tissue element = 8 µg/kg

*Fish tissue supersedes water column

Both elements would be criteria
Criterion Options – Fish + Water (Domestic Water Supply Use)

1. Calculate criteria based on Idaho exposure factors and Idaho specific BAF
2. Narrative criteria
1. Calculate criteria based on Idaho exposure factors and Idaho specific BAF

\[
F + W = \left( \frac{1 \times 10^{-5}}{1.5 \ (mg/kg \ day)^{-1}} \right) \times \left( \frac{80 \ kg}{2.4 \ L + (0.0665 \ kg/day \times 1.12 \ L/ka)} \right)
\]

\[WQC = 0.22 \ \mu g/L\]
Narrative Criteria

• 58.01.02.100.03. **Domestic (DWS):** 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.
Compliance with F+W criteria for Arsenic based on not impairing the use

Example:

– *For waters designated as DWS, waters must be free of inorganic arsenic in concentrations that would impair the DWS use.*

– *Inorganic arsenic must not exceed concentrations that would require additional treatment or removal prior to delivery as public drinking water.*
Next Steps

• Review comments to options presented
• DEQ will continue quarterly monitoring at targeted sites
• DEQ will continue to monitor EPA progress on revising toxicological assessment of iAs
Next Steps

• Begin drafting proposed rule language
Questions/Discussion