Outline

• Review Rulemaking
• Review Timeline
• Monitoring Results
  – Targeted Water
  – Fish Tissue
• Request for Feedback
• Next Steps
Overview of Rulemaking

- Previous Meetings
  - April 19, 2018
  - May 23, 2018
  - June 27, 2018
  - July 13, 2019
  - November 20, 2019
<table>
<thead>
<tr>
<th>Year</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>2016</td>
<td>EPA reconsiders, disapproves</td>
<td>2018</td>
<td>Idaho initiates rulemaking, EPA and NWEA modify consent decree</td>
<td>2023</td>
<td>New state or Federal Criteria</td>
<td></td>
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</tr>
</tbody>
</table>

**WHAT A LONG STRANGE TRIP IT'S BEEN**
Monitoring

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

- Monthly total and inorganic in water
- Easily accessible throughout year
- Areas of interest
- Above major anthropogenic sources
- Spread throughout state
# Monitoring Results - Targeted

Monthly samples from August 2019-February 2020

<table>
<thead>
<tr>
<th>iAs (µg/L)</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
<th>Jan</th>
<th>Feb</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>40</td>
<td>40</td>
<td>36</td>
<td>39</td>
<td>38</td>
<td>37</td>
<td>37</td>
</tr>
<tr>
<td>Range</td>
<td>0.05 – 11.90</td>
<td>0.05 – 9.48</td>
<td>0.04 – 19.80</td>
<td>0.04 – 16.30</td>
<td>0.04 – 14.30</td>
<td>0.05 – 15.30</td>
<td>0.05 – 12.60</td>
</tr>
<tr>
<td>Geo Mean</td>
<td>0.88</td>
<td>0.76</td>
<td>0.65</td>
<td>0.71</td>
<td>0.65</td>
<td>0.68</td>
<td>0.69</td>
</tr>
<tr>
<td>Avg</td>
<td>1.97</td>
<td>1.71</td>
<td>1.87</td>
<td>1.78</td>
<td>1.76</td>
<td>1.77</td>
<td>1.65</td>
</tr>
</tbody>
</table>
Targeted Ambient Arsenic

Inorganic As (µg/L)
August 2019

- 0.040 - 1.000
- 1.00 - 2.000
- 2.00 - 6.000
- >6.00
Variability

\[ CV\% = 100 \times \left( \frac{SD}{\bar{x}} \right) \]

- CV’s ranged from 4.8% to 86.7%
- Average CV was 30.2%
3.060 – 3.550 µg/L
CV = 4.8%
3.060 – 3.550 µg/L
CV = 4.8%
0.230 – 1.240 µg/L
CV = 86.7%

Graph showing the concentration of iAs (µg/L) from April (A) to February (F). The concentration increases from April to December, with the highest concentration in December (D).
1.340 – 3.53 µg/L
CV = 43.2%
1.340 – 3.53 µg/L

CV = 43.2%
6.930 – 19.800 µg/L  
CV = 32.0%

5.760 – 11.900 µg/L  
CV = 26.3%
6.930 – 19.800 µg/L  
CV = 32.0%

5.760 – 11.900 µg/L  
CV = 26.3%
6.930 – 19.800 µg/L
CV = 32.0%

5.760 – 11.900 µg/L
CV = 26.3%
Probabilistic As Accumulation

- 24 Sites
- Arsenic in gamefish and water
Flow

40 x wetted width

Left quarter

Center

Right quarter
## Results – Probabilistic Water Column

<table>
<thead>
<tr>
<th></th>
<th>Water</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>iAs (µg/L)</td>
</tr>
<tr>
<td>Range</td>
<td>0.04-8.12</td>
</tr>
<tr>
<td>Interquartile Range</td>
<td>0.26-1.61</td>
</tr>
<tr>
<td>Mean</td>
<td>1.42</td>
</tr>
<tr>
<td>Median</td>
<td>0.97</td>
</tr>
</tbody>
</table>
## Results – Probabilistic Fish Tissue

<table>
<thead>
<tr>
<th>Fish Tissue</th>
<th>BAF (L/kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>iAs (µg/kg)</td>
</tr>
<tr>
<td>Range</td>
<td>0.20-10.00</td>
</tr>
<tr>
<td>Interquartile Range</td>
<td>0.30-2.00</td>
</tr>
<tr>
<td>Mean</td>
<td>1.85</td>
</tr>
<tr>
<td>Median</td>
<td>0.60</td>
</tr>
</tbody>
</table>
iAs in Water and Fish

\[ y = 0.1802x + 1.5901 \]

\[ R^2 = 0.0116 \]
iAs in Water and Fish (remove highest)

\[ y = 0.4526x + 1.3088 \]

\[ R^2 = 0.0451 \]
tAs in Water and Fish

Fish Tissue tAs (mg/kg) vs. Water Column tAs (μg/L)

Regression equation: $y = 0.0021x + 0.0752$

$R^2 = 0.0014$
tAs in Water vs. iAs in Fish

![Graph showing the relationship between tAs in water and iAs in fish. The equation is given as $y = 0.099x + 1.6794$ with $R^2 = 0.004$.](image)

- Y-axis: Fish Tissue iAs (µg/kg)
- X-axis: Water Column tAs (µg/L)

The graph indicates a weak positive correlation between tAs in water and iAs in fish.
Removing results <MRL does not improve relationship
What about feeding habit?
Does species matter?
Preliminary Conclusions

• Although iAs in water can be highly variable, that variability does not appear to be based on seasonality or geography
• We can calculate BAFs, but they are highly variable, and the source of variability is not predictable
• One-time sample of water column may lead us to over- or under-estimate actual BAF at each site
Preliminary Conclusions

• Additional sampling could supplement our understanding of iAs in fish tissue
• May not be any relationship of iAs in water column to what consumers are exposed to through consumption of fish tissue
Next Steps

• Continue monitoring?
  – Determine monitoring design
    • Continue probabilistic
    • Limited sites, with individual fish
    • Sites located at areas of high, low, or full range of ambient As conditions
Possible Approach?

• Collect up to 10 individual fish of the same species (or Genus) from 4 to 6 sites
• Sites selected to represent range of ambient concentrations, located at or near targeted sites to leverage monthly samples
Comments due April 30

Questions?

Thank you