Protecting Private Well Users’ Health: 
results from two statewide surveys

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Talking Points

• Minnesota geology and private well use
• Arsenic study
• Private well household survey
• Next steps
• Questions

Image credit: USA Vacation, Tourism and Travel Guide (www.vacation2usa.com/p1_state_minnesota_map.php)
Minnesotans’ drinking water sources

- Public Water System: 79% (1.2 million people)
- Private Well: 21% (1.2 million people)
Public Health Issue: **Contaminants**

- Nitrate concentrations in new wells (1991-2016)
Two statewide studies

**Arsenic study**
Do arsenic results represent the long-term arsenic concentration for that well?

**Household survey**
Are private well users taking action to ensure safe drinking water?
Arsenic study: methods

Well location
• Varied geology

Sample point
• Off the rig
• Plumbing

Sample method
• Filtered
• Unfiltered

Sample timing
• Immediate
• 6 months
• 12 months

264 wells sampled
## Arsenic study results: sample point

<table>
<thead>
<tr>
<th>Driller v MDH Recensoring</th>
<th>0 Mo. Plumbing</th>
<th>0 Mo. Rig</th>
<th>3-6 Mo. Plumbing</th>
<th>12 Mo. Plumbing</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Driller Collection</strong></td>
<td>TAs</td>
<td>AqAs</td>
<td>TAs</td>
<td>AqAs</td>
</tr>
<tr>
<td>0 Mo. Plumbing</td>
<td>Not different</td>
<td>Not different</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>0 Mo. Rig</td>
<td>--</td>
<td>--</td>
<td>Not different</td>
<td>Different</td>
</tr>
</tbody>
</table>

Sampling **at the plumbing** better predicts long-term concentration.
Arsenic study results: **filtering**

Filtering better predicts long-term concentration.

**Driller—0 month unfiltered**

**MDH—0 month filtered**

$R^2 = 0.6382$, $R^2 = 0.8175$
Arsenic study results: **timing**

**Round 1 to 2:** Arsenic concentrations (µg/L)

Sampling 3-6 months after construction better predicts long-term concentration.

**Round 2 to 3:** Arsenic concentrations (µg/L)

- Driller—0 month unfiltered
- MDH 3-6 months unfiltered
- 12 months filtered

$$R^2 = 0.6631$$

$$R^2 = 0.9375$$
Concentration changes over a year.

Outer Ring: MDH Filtered

Inner Ring: Driller Unfiltered

Concentration may increase or decrease over time.

Arsenic study results: changes in concentration

- >10 ug/L: 5%
- 5 to 10 ug/L: 18%
- 1 to 5 ug/L: 2%
- +/- <1 ug/L: 14%
- -1 to -5 ug/L: 4%
- -5 to -10 ug/L: 14%
- > -10 ug/L: 18%
Household survey: methods

Survey sent to **3,815** private well users with elevated arsenic (2016)

- Demographic information
- Actions taken
- Well stewardship

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Household survey

Are private well users taking action to ensure safe drinking water?

798 responses
Household survey: Did respondents take action?

<table>
<thead>
<tr>
<th>Reason for not taking action</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not concerned about arsenic level</td>
<td>50</td>
</tr>
<tr>
<td>Wasn’t sure what to do or who to contact</td>
<td>21</td>
</tr>
<tr>
<td>Treatment options too expensive</td>
<td>15</td>
</tr>
<tr>
<td>Treatment systems too difficult to use and maintain</td>
<td>15</td>
</tr>
<tr>
<td>Haven’t gotten around to it, but plan to</td>
<td>11</td>
</tr>
<tr>
<td>Other</td>
<td>16</td>
</tr>
</tbody>
</table>

Multiple selections allowed

34% did not take any action

Arsenic level is...
- Typical for the area
- Too low to be dangerous
- Would decrease with time

Some did not take action because of misinformation
Household survey: Have respondents tested their water?

MDH recommends:
- Coliform Bacteria (every year)
- Nitrate (every other year)
- Arsenic (at least once)
- Lead (at least once)

<20% tested at recommended frequency

<table>
<thead>
<tr>
<th>Selected as “very important” to prompt testing</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doctor’s recommendation</td>
<td>59</td>
</tr>
<tr>
<td>Infant/young child in home</td>
<td>50</td>
</tr>
<tr>
<td>Well testing event in my community</td>
<td>50</td>
</tr>
<tr>
<td>Town official’s suggestion</td>
<td>31</td>
</tr>
<tr>
<td>News article about testing</td>
<td>21</td>
</tr>
</tbody>
</table>
### Household survey: habits and preferences

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Where people look for water quality information*</th>
<th>How people would like to pick up and return a test kit</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;50 years old</td>
<td>Internet</td>
<td>Order online &amp; return by mail</td>
</tr>
<tr>
<td>College degree +</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Higher income</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;50 years old</td>
<td>Water testing laboratory</td>
<td>Pick up &amp; drop off at local spot</td>
</tr>
<tr>
<td>Less than two year degree</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lower income</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Public Health Action: Barriers & Current Efforts

Low risk perception

Knowledge barriers

Financial barriers

Convenience barriers

Current Efforts

• Raise awareness
• Increase accurate risk perception
• Make information more accessible
Public Health Action: Barriers & Future Efforts

Future Efforts Include

• Make testing and treatment more affordable
• Make testing more accessible
Questions?

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