2007

Human Health Impacts of Contaminants Found in Local Drinking Water Supply

Elizabeth Benson
Colby College

Dylan Harrison-Atlas
Colby College

Follow this and additional works at: https://digitalcommons.colby.edu/ugrs

Recommended Citation
https://digitalcommons.colby.edu/ugrs/3

This Article is brought to you for free and open access by the Student Research at Digital Commons @ Colby. It has been accepted for inclusion in Undergraduate Research Symposium (UGRS) by an authorized administrator of Digital Commons @ Colby. For more information, please contact mfkelly@colby.edu.
THINK BEFORE YOU DRINK: WHAT’S IN YOUR WATER?
A thorough analysis of over 22 million tap water quality tests performed by the Environmental Working Group, an environmental watchdog organization, found 260 contaminants in public drinking water supplies, many in concentrations approaching or exceeding health-based limits set by the EPA.

Kennebec Water District Supplier
- Water supplied from China Lake, serves 22,478 people
- 18 contaminants detected between 1998 and 2002
- 3 contaminants found in concentrations exceeding health-based limits
  - Arsenic
  - 2 Trihalomethanes: Bromodichloromethane and Chloroform

WHERE DO THESE CONTAMINANTS COME FROM?
In addition to being naturally occurring, contaminants may enter drinking water supplies through industrial sources, agricultural practices, urban pollution, sprawl, and water treatment byproducts.

WHEN AM I EXPOSED TO THESE CONTAMINANTS?
Exposure occurs through ingestion, as well as dermal absorption and inhalation while bathing.

SO WHAT?
Health risks for the general public include skin damage, increased risk of cancer, circulatory problems, and multiple toxicities. Some peoples such as children, pregnant women, and those with compromised immune systems are more vulnerable to the health risks associated with these contaminants.

WHAT CAN YOU DO?
Alternatives
- Private well
- Water dispenser
- Bottled water
Reducing Exposure
- Activated carbon filter
- Ion exchange unit
- Reverse osmosis unit
- Distillation unit
- UV disinfection unit
- Combination treatment units

LEARN MORE!
EWG: http://www.ewg.org/tapwater/yourwater/index.php
EPA: http://www.epa.gov/ebtpages/water.html
Kennebec Water District: www.kennebecwater.org

This fact sheet was created by Liza Benson & Dylan Harrison-Atlas for ES266: The Environment & Human Health, Colby College May 2007.
Human Health Impacts of Contaminants Found in Local Drinking Water Supply
Elizabeth Benson ’07 and Dylan Harrison-Atlas ’07
Environmental Studies Program, Colby College

INTRODUCTION

All sources of drinking water, even those naturally occurring, contain some contaminants. A thorough analysis of over 22 million tap water quality tests performed by the Environmental Working Group, an environmental watchdog organization, found an alarming number of contaminants in public drinking water supplies. These results have been compiled into a user-friendly Tapwater database available on the web. Nationwide, 260 contaminants have been detected in drinking water supplies in concentrations approaching or exceeding health-based limits set by the EPA. Many contaminants are currently unregulated by the government, and in some cases not even tested for. In addition to being naturally occurring, contaminants may enter drinking water supplies through industrial sources, agricultural practices, urban pollution, and by way of treatment byproducts. Exposure to these contaminants is not limited to ingestion; they can also enter through dermal absorption and inhalation in showers. Health risks for the general public include skin damage, increased risk of cancer, circulatory problems, and more.

At low levels, these contaminants generally are not harmful to our drinking water. However, children, pregnant women, and people with compromised immune systems are more susceptible to the health risks associated with these contaminants. People should take additional precautions with drinking water.1

RESULTS

Kennebec Water District Supplier

| Water supplied from China Lake | approximately 22,479 people in Waterville, Winslow, Fairfield-Benton, Vassalboro, and Oakland |

Species detected between 1998 and 2002

Table 1:

<table>
<thead>
<tr>
<th>Contaminant</th>
<th>Action Level (ppb)</th>
<th>WHO-QDG (ppb)</th>
<th>EPA Human Health WQC (ppb)</th>
<th>NDC</th>
<th>Health Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arsenic</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lead</td>
<td>5</td>
<td>15</td>
<td>15</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fluoride</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BPA</td>
<td>0.005</td>
<td>0.005</td>
<td>0.015</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 2:

<table>
<thead>
<tr>
<th>Treatment Device</th>
<th>Purpose</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Activated carbon filter</td>
<td>Reduces lead, iron, and manganese</td>
<td>$250-$500</td>
</tr>
<tr>
<td>Ion exchange unit (water filter)</td>
<td>Removes lead, copper, and other heavy metals</td>
<td>$100-$200</td>
</tr>
<tr>
<td>Ultraviolet disinfection unit</td>
<td>Removes chlorine and chloramines</td>
<td>$1,000-$2,000</td>
</tr>
</tbody>
</table>

Methods

The data presented here was collected from several reliable sources. Much of the information concerning contaminants found in the Kennebec Water District's supply was provided by the Tapwater database of the Environmental Working Group, a public water testing organization whose objective is to publicize important environmental issues. Other useful data also publicly available on the internet, was taken from the EPA, the Massachusetts Department of Environmental Protection, the Maine State Department of Environmental Protection, and the Maine Department of Environmental Protection. Additional useful data, which is not publicly available on the internet, was taken from the EPA, the Maine State Department of Environmental Protection, and the Maine Department of Environmental Protection. Additional useful data, which is not publicly available on the internet, was taken from the EPA, the Maine State Department of Environmental Protection, and the Maine Department of Environmental Protection.

CONCLUSIONS

Compared to nationwide levels, Kennebec Water District drinking water supply is relatively less contaminated. Concerned citizens can use an alternative to public drinking water supplies, or actively monitor their exposure. Furthermore, it is recommended that local residents take to measure their water quality via websites like the Environmental Working Group's Tapwater database or through local sources. Additionally, the EPA's Right-to-Know laws provide information about possible chemical exposures. Health effects can be found on the EPA's website: (http://www.epa.gov/owow/risk/index.html). Because exposure to tapwater contaminants is not limited to ingestion, it should be monitored with all routes of exposure, including chlorination. There are many effective ways to limit the risk of health impacts associated with drinking water, including the use of several viable alternatives to public drinking water supplies.

Alternatives

1. Bottled water (bought at grocery store, allo-bottle dispenser, and receive delivered water directly to your home)

2. These are generally more expensive compared to water from a public water system. The FDA requires bottled water used for drinking, there are still potential risks as bottled water does not undergo the same testing and reporting as tap water supplies.

PRIVATE WELLS

Private wells are not subject to EPA standards and unlike the public drinking water systems they do not have experts regularly checking the water’s source and its quality before it is sent to the tap. Households using private wells should take special precautions to ensure the protection and maintenance of their drinking water supplies. The same contaminants existing in public drinking water systems exist in private wells. The risk of having problems with contaminants depends on the wells construction, location, maintenance, and local environment. The quality of the aquifer from which the water is drawn, as well as human activities in the nearby area may influence well water safety. Identifying the evident as well as less obvious threats will help you decide the types of tests needed.

1. Talk to local experts
2. Test water periodically
3. Above test results interpreted and explained by experts
4. Carry out regular maintenance schedules
5. Always repair any problems

References

1. The Environmental Working Group
2. The Health Resources and Services Administration
3. Water-quality facts and figures. 2000
4. The Environmental Health Fact Book. 2001
5. Drinking Water. 2002
9. The Johns Hopkins University
10. The Environmental Working Group

This project was part of a Community Environmental Health Assessment for ES266: The Environment and Human Health. 
Professor Gail Carlson.