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Human Health Impacts of Contaminants Found in Local Drinking Water Supply

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COMMUNITY ENVIRONMENTAL HEALTH ASSESSMENT

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.

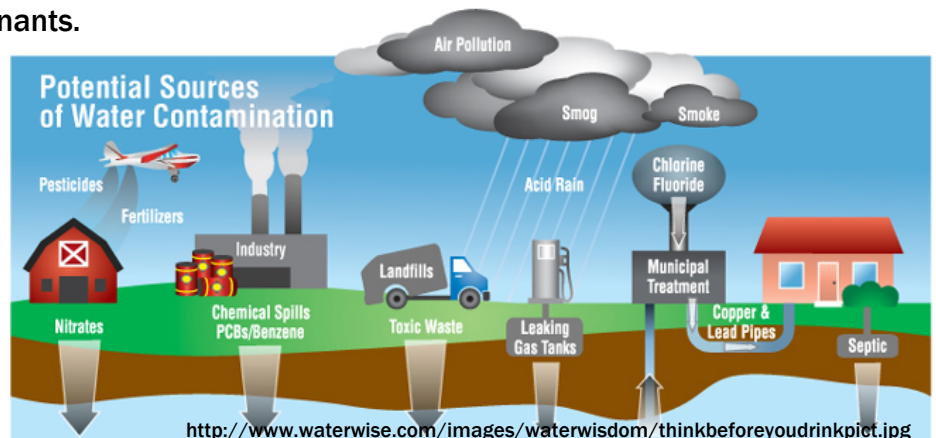
WHAT CAN YOU DO?

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

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Human Health Impacts of Contaminants Found in Local Drinking Water Supply

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INTRODUCTION

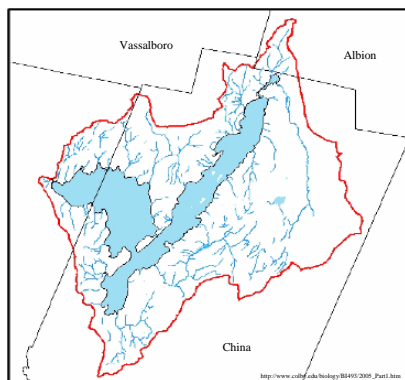
All sources of drinking water contain some naturally occurring contaminants and many contain unnatural contaminants. A thorough analysis of over 22 million tap water quality tests performed by the Environmental Working Group, an environmental watchdog organization, found an alarming number of contaminants in public drinking water supplies. These results have been compiled into a user-friendly Tapwater database¹ available on the web. Nationwide, 260 contaminants have been detected in drinking water supplies, many in concentrations approaching or exceeding health-based limits set by the EPA¹. Many contaminants are currently unregulated by the government and do not have a set limit, known as the Maximum Contaminant Level, which is dictated by cost and the best available treatment technology². The Maximum Contaminant Level Goal, on the other hand, is based solely upon health considerations and is non-enforceable. In addition to being naturally occurring, contaminants may enter drinking water supplies through industrial sources, agricultural practices, urban pollution, spray, and water treatment byproducts. Exposure to these contaminants is not limited to ingestion and can also occur through dermal absorption and inhalation in the shower³. Health risks for the general public include skin damage, increased risk of cancer, circulatory problems, and multiple toxicities⁴.

At low levels, these contaminants generally are not harmful in our drinking water. However, children, pregnant women, and people with compromised immune systems are more vulnerable to the health risks associated with these contaminants. Vulnerable peoples should take additional precautions with drinking water^{4,5}



GOALS: This research project was conducted in order to learn more about our local drinking water and to characterize our exposure to contaminants. We hope to increase public awareness of water quality issues by educating the local residents about their drinking water in order to promote public health and minimize exposure to some of the contaminants contained within public water supplies.

China Lake, Maine and Surrounding Watershed



METHODS

The data presented here was collected from several reliable sources. Most of the information concerning contaminants found in the Kennebec Water District supply was provided by the Tapwater database of the Environmental Working Group, a public watchdog organization whose objective is to publicize important environmental issues. Other useful data, also publicly available on the internet, was taken from the EPA and the Maine state government websites. Data from scientific studies were gathered from journal articles.

RESULTS

Kennebec Water District Supplier

- Water supplied from Chinle Lake
 - Serves 22,478 people in Waterville, Winslow, Fairfield, Benton, Vassalboro, and Oakland⁶
 - 18 contaminants detected between 1998 and 2002
 - 3 contaminants found in concentrations exceeding health-based limits
 - ▲ Arsenic
 - ▲ 2 Trihalomethanes; Bromodichloromethane and Chloroform
- Table 1 shows significant contaminants found in drinking water supplied by the Kennebec Water District Supplier* and their respective human health impacts¹.

Table 1¹

Contaminant	Avg. conc. (ppb) <i>Kennebec Water District Supplier</i>	Max. conc. (ppb) <i>Kennebec Water District Supplier</i>	EPA Human Health WQC ¹ (ppb)	MCL	Health Impacts
Arsenic	0.57	1.4	0.02	10	Exposure linked to increased incidence of liver, lung, bladder, and kidney cancers; causal relationship with skin cancer ²
Total Trihalomethanes (TTHMs)	24.89	54.1	5.7	80	1100-9300 cases of cancer per year expected to be prevented by lowering the standard from 100 to 80 ppm- EPA estimate ² ; association with spontaneous abortion ³
Copper	N/A	N/A	1300	1300	Kidney and Liver Damage ⁴
Radon	526.13 pCi/L	1008 pCi/L	Unregulated	Unregulated	180 annual deaths from radon in U.S. drinking water- National Academy of Sciences ⁵

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 reduce their exposure. Furthermore, it is recommended that local residents continue to monitor their water quality via websites like the Environmental Working Group's <http://www.ewg.org/ap/water/yourwater/index.php> or through local sources. Additionally, the EPA's Right-to-Know laws provide information about possible chemical exposures which can be found on <http://www.epa.gov/cbrpa/water.html>. Because exposure to tapwater contaminants is not limited to ingestion, care should be exercised with all routes of exposure, including showering. There are many effective ways to limit the risk of health impacts associated with drinking water contaminants, including the use of several viable alternatives to public water supply.

Alternatives⁴

- Bottled water bought at grocery store
- Buy water dispenser and receive delivered water
- Private well (see sidebar)

These alternatives are generally more expensive compared to water from a public water system. The FDA regulates bottled water used for drinking though there are still potential risks as bottled water do not undergo the same testing and reporting as treated public water

Reducing Exposure^{4,5,9}

- Activated carbon filter
- Ion exchange unit
- Reverse osmosis unit
- Distillation unit
- UV disinfection unit
- Combination treatment units



Determining treatment method depends on the contaminants which need to be removed. These products can range from inexpensive countertop filters to expensive household filtration systems (Table 2). Installation of household systems can be expensive and maintenance, cleaning, and plumbing will add to the expenses.

Table 24.5.9

TREATMENT DEVICE	PURPOSE	PRICE*
Activated Carbon Filter (includes mixed media that remove heavy metals)	-resolves odor and taste problems -removes chlorination byproducts, cleaning solvents, pesticides, and metals -Arsenic, lead, mercury	Faucet filters: \$20- \$60 Pitcher filters: <\$25
Ion Exchange Unit (water softener)	-removes "hardening" minerals, radium, barium, fluoride	\$900-\$1800 + installation costs (\$250+)
Reverse Osmosis Unit (with carbon)	-removes nitrates, sodium, foul tastes, smells and colors -reduce level of pesticides, dioxins, chloroform, and petrochemicals	\$400-\$2,500 + replacement filters: \$100-\$200
Distillation Unit	-removes nitrates, bacteria, sodium, hardness, dissolved solids, heavy metals, organic compounds	\$400-\$1,000 + operating costs + replacement filters
Ultraviolet Disinfection Unit	-kills harmful microorganisms	\$300-\$900 + lamp replacement (\$40-\$100)
Combination Treatment Units	-disinfection byproducts	

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 needed¹⁰.

KEEPING YOUR WELL WATER SAFE:

- Talk to local experts
- Test water periodically
- Have test results interpreted and explained by experts
- Carry out regular maintenance schedules
- Immediately repair any problems¹⁰

<http://dx.doi.org/10.1017/S0007122613000011>

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