

## A parable: Why do you drink municipal water?

It is very important to remember that just because something can be *measured* doesn't mean that it is going to do you *harm*.

This is from a document I wrote for naive readers in 2014. [September 2017: my apologies for no references—they are quite old and not maintained by the UK Food Standards Agency and I was not documenting things as well then as I do now]

- Benzene is a solvent that contaminates many water supplies; its levels are regulated because it is carcinogenic. At first glance a plausible reaction is: "I don't want any benzene in my water." This goal (ZERO benzene) is, alas, very hard and expensive to achieve.
- Benzene is actually produced even in soft drinks containing vitamin C (anti-oxidant) because of the use of benzoic acid as a (common) preservative. The highest level measured in soft drinks (in another country, before it was regulated) was 90 parts per billion, while the EPA has set 5 parts per billion as the maximum permissible level in drinking water. The "detection limit" (how little of a pollutant can be measured per unit volume of water) is about 0.2 parts per billion. [However, a British health services agency has estimated that people would need to drink at least 20 liters (5.5 gal) per day of such soft drink to equal the amount of benzene they *already* would breathe from city air in one day.]
- Is there lots of evidence that many people are dying of exposure to benzene in city air? No. Thus it's even harder to conclude that people drinking soft drinks preserved with benzoic acid and vitamin C are having problems with benzene. The EPA estimates that 10 ppb benzene in drinking water that is consumed regularly, or exposure to 0.4 ppb in air over a LIFETIME, could cause a risk of one additional cancer case for every 100,000 exposed persons.

So: why do I drink tap water from Arvada? For me, the answer is: because it is *monitored* and people know very well how to *measure* the contaminants (at levels far below what could present a health risk) that would make the water dangerous.

Public health depends on an intricate network of basic science, monitoring, reporting, and trust in the FDA, the EPA, and local municipalities. Biologists and epidemiologists measure the impact of various levels of a contaminant on a target population. A consensus is established among professionals about what limiting concentrations should be to mitigate risk for a very large fraction of the population. Civil servants measure what is actually in the water and local municipalities report (typically annually) to the public they serve.

If you adopt a rigid stance of suspicion of all government, federal through local, you might as well just hunker down and drink only Perrier (if you can afford it). I trust (in the absence of severe government cuts that could happen under the current federal administration) that the system works.