

Fluoride Action Network

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How Much Arsenic is Fluoridation Adding to the Public Water Supply?

by Michael Connett

Ninety percent of the fluoride we use to fluoridate U.S. water systems comes directly from the pollution scrubbing systems of the phosphate fertilizer industry. Recently, there has been a lot of concern amongst clean water activists about the purity of this industrial grade fluoride, known as hydrofluosilicic acid. As Florida fluoride researcher George Glasser has pointed out, this hydrofluosilicic acid contains trace amounts of heavy metals such as lead, mercury, and arsenic.

Proponents of fluoridation, however, claim that while heavy metals are found in the acid, they are at such low levels as to be of no concern. As Thomas Reeves of the Centers for Disease Control and Prevention recently stated, "the point I'm trying to make is it's really not a problem" (Wenatchee World, October 20, 2000).

After a quick look at the numbers, Reeves would seem to be right. After all, the hydrofluosilicic acid is diluted down approximately 240,000 times when added into the public's drinking water. If, therefore, these heavy metals are in concentrations of parts per million in the undiluted fluorosilicic acid, they will be much lower after being diluted down 240,000 to 1.

However, while this argument sounds legitimate, a careful look at the numbers reveals a different picture.

Take for instance, arsenic.

In a recent letter (July 7, 2000) to Congress, NSF International (National Sanitation Foundation) submitted the results of tests it has conducted on hydrofluosilicic acid over the past few years.

According to the NSF, the most common contaminant found was arsenic. (Arsenic was found about 5 times more frequently than any other contaminant and at considerably higher levels).

While not all hydrofluosilicic acid was found to contain arsenic, the NSF states that where found, the average level of arsenic in the acid would lead to arsenic water levels, after dilution, of 0.43 parts per billion (ppb). (When the "non-detects" are factored in, the average arsenic level would be 0.1 ppb; see <http://www.fluoridealert.org/NSF-letter.pdf>). The maximum levels of arsenic found by the NSF would result in arsenic water levels of 1.66 parts per billion.

Putting the numbers into Perspective:

To the ordinary person, these numbers seem small and insignificant, which is exactly what the NSF and the CDC's Thomas Reeves claim. However, in examining their arguments, one

finds that the NSF and Reeves are basing their reasoning on the fact that 0.43 parts per billion arsenic falls below the EPA's Maximum Contaminant Level (MCL). In other words, they are looking to the letter of the law, and the letter of the law says adding this much arsenic to the water is ok.

But the letter of the law on arsenic is currently under serious challenge.

According to a 1999 review done by the National Academy of Sciences, "it is the subcommittee's consensus that the current EPA MCL for arsenic in drinking water of 50 µg/L (50 parts per billion) does not achieve EPA's goal for public-health protection and, therefore, requires downward revision as promptly as possible."

The Natural Resources Defense Council (NRDC) states that the EPA's current Maximum Contaminant Level for arsenic, "is grossly inadequate for protecting public health." The NRDC points out that the EPA's Maximum Contaminant Level was set in 1942, "before arsenic was known to cause cancer." Arsenic, which has since been classified as a Class 1 human carcinogen, is now known to cause cancer of the skin, and cancer of the internal organs, particularly the lung and bladder.

In light of the growing accumulation of scientific literature on arsenic, the NRDC is currently calling on the EPA to set a new Maximum Contaminant Level for arsenic at 3 parts per billion. However, the NRDC argues that even 3 parts per billion is not a satisfactory level. For as they state, "Based on an extrapolation of NAS's risk estimates, even a relatively strict arsenic standard of 3 ppb could pose a fatal cancer risk several times higher than EPA has traditionally accepted in drinking water."

In fact, according to data from the National Academy of Sciences, just 0.5 parts per billion arsenic in the water "presents the highest cancer risk EPA traditionally allows in tap water" (see chart 1 below) (NRDC, 2000). According to NAS data, the Natural Resources Defense Council estimates that drinking water containing just 0.5 parts per billion presents the public with a 1 in 10,000 risk of developing cancer.

Recent epidemiological work from Finland (Kurtio, et. al, 1999) found that people drinking water with 0.1 to 0.5 parts per billion arsenic, had an approximately 50 percent greater risk of getting bladder cancer than their countrymen drinking water with arsenic levels less than 0.1 parts per billion (NRDC, 2000). The range 0.1 to 0.5 ppb is the range of arsenic we can expect to add to the water from the use of hydrofluosilicic acid.

According to Dr. Paul Connett, Professor of Chemistry at St. Lawrence University, NY, and an outspoken critic of fluoridation, "I was shocked by these numbers. Like many others I once thought that the dilution factor would take these toxic metal concentrations below levels of concern. To have arsenic near a cancer risk level of 1 in 10,000 is very serious."

Connett added that, "the US EPA normally likes to keep exposure to carcinogens below a risk level of 1 in a million. 1 in 10,000 is unacceptably high for a practice which yields very small, if any, benefits and for which there are simpler and safer alternatives."

In conclusion: What do we know?

* 90% of the fluoride used to fluoridate US water systems comes from the pollution scrubbing devices of the phosphate fertilizer industry. It is industrial grade, not pharmaceutical grade.

* The most common contaminant found with the captured fluoride acid (hydrofluosilicic acid) is arsenic.

* When detected, the average amount of arsenic found in the acid would lead to levels of arsenic in drinking water of 0.43 parts per billion.

* If we include the samples that did not contain arsenic, the average amount of arsenic fluoridation is adding to the water would be 0.1 ppb.

* The level of arsenic in hydrofluosilicic acid varies, reaching levels high enough to produce concentrations of 1.66 parts per billion in water.

* According to data from the National Academy of Sciences, drinking water containing 0.5 parts per billion arsenic presents a 1 in 10,000 risk of developing cancer.

* A study from Finland (Kurtio, et al, 1999) found that people drinking water with 0.1 to 0.5 parts per billion arsenic had a 50% greater risk of developing bladder cancer than people drinking water with less than 0.1 ppb.

Chart 1: Lifetime Risks of Dying of Cancer from Arsenic in Tap Water
Based upon the National Academy of Sciences' 1999 Risk Estimates*

From the Natural Resource Defense Council's
February 2000 Report "Arsenic & Old Laws"

Arsenic Level in Tap Water (in parts per billion, or ppb)	Approximate Total Cancer Risk (assuming 2 liters consumed/day)
0.5 ppb (highest cancer risk EPA usually allows in tap water)	1 in 10,000 (highest cancer risk EPA usually allows in tap water)
1 ppb	1 in 5,000
3 ppb	1 in 1,667
4 ppb	1 in 1,250
5 ppb	1 in 1,000
10 ppb	1 in 500

20 ppb	1 in 250
25 ppb	1 in 200
50 ppb	1 in 100

*See note 3 at <http://www.nrdc.org/water/drinking/arsenic/chap3.asp> for details on how the NRDC calculated total cancer risk based on an extrapolation of NAS's risk estimates, which assumed a linear dose-response and no threshold.

References:

Gilstrap, Kathleen. (2000). Fluoride battle heats up: Vote is non-binding, but that won't make this election any less volatile. *Wenatchee World*. 20 October 2000: <http://www.wenworld.com/news/friday/news.html>

Kurttio P, Komulainen H, Hakala E, Kahelin H, Pekkanen J. (1998). Urinary excretion of arsenic species after exposure to arsenic present in drinking water. *Arch. Environ. Contam. Toxicol.* 34: 297-305.

Natural Resources Defense Council. (2000). *Arsenic and Old Laws: A Scientific and Public Health Analysis of Arsenic Occurrence in Drinking Water, Its Health Effects, and EPA's Outdated Arsenic Tap Water Standard*. <http://www.nrdc.org/water/drinking/arsenic/aolinx.asp>

Executive Summary and Recommendations

Chapter 1: Arsenic Found at Levels of Concern in the Tap Water of Tens Of Millions of Americans in 25 States

Chapter 2: An Overview of the Scientific and Health Issues Raised by Arsenic Regulation Chapter 3: Conclusions for Safe Regulation of Drinking Water Bibliography

Hazan, Stan (2000). Letter to Florida Department of Health from Stan Hazan, General Manager, Drinking Water Additives Certification Program, National Sanitation Foundation International. 24 April 2000. <http://www.fluoridealert.org/NSF-Letter.pdf>

Hazan, Stan. (2000). Letter to Rep. Ken Calvert from Stan Hazan, General Manager, Drinking Water Additives Certification Program, National Sanitation Foundation International. 7 July 2000.

http://www.citizens.org/Food_Water_Safety/Fluoridation/Materials/NSF_response.pdf

A Note about Current Levels of Arsenic in US Water Systems

According to analysis of water conducted in 25 US states, approximately 70% of the tap water tested was found to contain between 0 (non-detectable) to 3 parts per billion arsenic (see <http://www.nrdc.org/water/drinking/arsenic/chap1.asp>).

Why Import 'hydrofluosilicic acid' containing Arsenic from Florida's phosphate fertilizer industry Pollution scrubbing systems, and injecting this 'toxic soup' into California's Drinking & Tap Waters ?