Q: What are the fluoridation chemicals that would be added to Portland's drinking water?

A: Industrial byproducts of fertilizer production that contain arsenic, lead and even lead.

Key references and excerpts

What fluoridation chemical would Portland use?

As has been reported in the Oregonian, the Portland Water Bureau has said Portland would use a chemical called **fluorosilicic acid** to "fluoridate" Portland's water.[1]

IMC Agrico - Phosphate Processing Facility.

Where does fluorosilicic acid come from?

It's hard to believe, but there is no factual dispute that fluorosilicic acid and the two other chemicals (sodium fluoride and sodium fluorosilicate) commonly used to fluoridate drinking water are industrial byproducts of phosphate fertilizer manufacturing and this is acknowledged by everyone from the National Academy of Sciences to longtime fluoridation proponents.[2] Maybe adding industrial byproducts to our drinking water didn't sound crazy in the 1950's, but the idea that we would add such chemicals into our drinking water today is so difficult to believe we provide the following excerpts and links to source documents that include the National Academy of Sciences and the most vocal fluoridation proponent, the CDC.

Factual support that fluoridation chemicals are industrial byproducts

The chief fluoridation engineer for the U.S. Centers for Disease Control (CDC), has plainly explained:

> "All of the fluoride chemicals used in the U.S. for water fluoridation, sodium fluoride, sodium fluorosilicate, and fluorosilicic acid, are byproducts of the phosphate fertilizer industry.[3] (*See* Attachment 1)

Actual barrels of Fluorosilicic acid

The National Research Council of the National Academy of Sciences similarly stated in its 2004 report on fluoride in drinking water:

> "The most commonly used [drinking water] additives are silicofluorides, not the fluoride salts used in dental products (such as sodium fluoride and stannous fluoride). Silicofluorides are one of the by-products from the manufacture of phosphate fertilizers."[4] (*See* Attachment 2)"

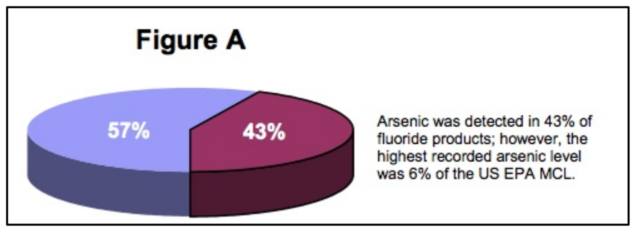
The CDC's website today similarly states that:

> Most fluoride additives used in the United States are produced from phosphorite rock. Phosphorite is used primarily in the manufacture of phosphate fertilizer….Approximately 95% of FSA [Fluorosilicic acid] used for water fluoridation comes from this process. The remaining 5% of FSA is generated during the manufacture of hydrogen fluoride or from the use of hydrogen fluoride in the manufacturing of solar panels and electronics.[5] (Attachment 3)

Dr. Kurt Ferre, one of Oregon's longtime fluoridation backers[6] has referred to fluoridation chemicals as "a useful byproduct of the phosphate fertilizer industry" and defended the addition of fertilizer manufacturing byproducts by saying, "If you look at the side of a soda can, the fourth ingredient is phosphoric acid - that too is a byproduct of the phosphate fertilizer industry." [7] (*See* Attachment 4)

43% of Fluoridation Chemicals Contain Arsenic.

Fluoridation chemicals are well documented to contain contaminates such as arsenic, lead and copper and this is acknowledged by the CDC and other fluoridation advocates who claim that the levels of such contaminants are too low to be of concern.[8]



Excerpt from contaminant report on fluoridation contaminants relied on by the CDC

Contaminants testing for fluoridation chemicals relied on by the CDC and conducted by the National Sanitation Foundation (NSF) [9] show:

- **43% of fluoridation products tested positive for arsenic;**
- **3% contain copper;**
- **2% contain lead[10]**

EPA, however, is clear that any increased level of arsenic increases cancer risks and any increase in lead exposure impairs children's IQ. [11] That is why EPA has set the health-based Maximum Contaminant Level Goals (MCLG) are zero for arsenic and lead. [12] MCLGs are "the level of contaminants in drinking water at which no adverse health effects are likely to occur." [13]

> **"The results in Table 1 indicate that the most common contaminant detected in these products [fluoridation chemicals] is arsenic, which is detected in 43% of the product samples."[1]**
>
> **- NSF Fluoridation "impurities" fact sheet (*see* Attachment 5 at p. 4)**

Fluoridation supporters such as the CDC and National Sanitation Foundation (NSF), which has documented the toxic contaminants in fluoridation products, say that the levels of arsenic and lead are not a problem because they are less than the Maximum Contaminant Level (MCL not the MCLG), which is the maximum legal toxics limit for drinking water, but it is not a health-based standard. [14] MCLs are completely inappropriate to apply to a contaminant you are knowingly adding to the drinking water.

MCLs are set only after considering the economic costs of actually removing contaminants from the drinking water. For example, while the health-based MCLG for arsenic is zero given its strong carcinogenic impact, the MCLG is 10 ppb since it is extremely costly for water districts to remove arsenic below that level.

As EPA explains, "The MCLG for arsenic is zero. EPA has set this level of protection based on the best available science to prevent potential health problems."[15] "The MCLG for lead is zero. EPA has set this level based on the best available science which shows there is no safe level of exposure to lead."[16]

NSF's tested contaminant levels in fluoridation chemicals and the fact sheet explains the results stating:

> **"The results in Table 1 indicate that the most common contaminant detected in these products [fluoridation chemicals] is arsenic, which is detected in 43% of the product samples."[17] (*See* Attachment 5 at p. 4)**

While NSF also notes that, "the highest recorded arsenic level was 6% of the US EPA MCL" again, this ignores the reality that EPA's MCL is not based on health impacts alone but reflects the economic compromise EPA makes given the high cost of removing arsenic from water that is already contaminated. (*See* Attachment 5 at p. 4).

NSF's same study found lead, which is well documented to cause decreased childhood IQ even at extremely low levels, in 2% of fluoridation chemicals it sampled as well as copper in 3% of samples.[18] While fluoridation supporters may dismiss a 2% rate as too small to worry about, if fluoridation were approved for Portland there's no avoiding that we all end up drinking increased lead as a result. The NSF study also documented mercury, cadmium, chromium and other toxics in fluoridation chemicals that are listed with their concentrations and frequency at Table 1 of NSF's fact sheet attached here.

While NSF and fluoridation promoters[19] have had little choice but to acknowledge that adding fluoridation chemicals to water means adding arsenic, lead, chromium, mercury and other toxics to the drinking water, they vigorously assert that the levels of contaminates are too small to be a concern and report the presence of arsenic, lead, copper and other toxics as if they somehow support the safety of fluoridation chemicals. The policy choice, however, of whether Portland should add any additional levels of arsenic, lead, mercury or other toxics to our drinking water is a real one that is directly related to Portland's choice about whether to add fluoridation chemicals to our water.

ATTACHMENT 1

Refer: FL-143
September 2000

THE MANUFACTURE OF THE FLUORIDE CHEMICALS

All of the fluoride chemicals used in the U.S. for water fluoridation, sodium fluoride, sodium fluorosilicate, and fluorosilicic acid, are useful byproducts of the phosphate fertilizer industry. The manufacturing process produces two byproducts: (1) a solid, calcium sulfate (sheetrock, $CaSo_4$); and (2) the gases, hydrofluoric acid (HF) and silicon tetrafluoride (SiF_4). A simplified explanation of the manufacturing process follows: Apatite rock, a calcium mineral found in central Florida, is ground up and treated with sulfuric acid, producing phosphoric acid and the two byproducts, calcium sulfate and the two gas emissions. These gases are captured by product recovery units (scrubbers) and condensed into 23% fluorosilicic acid. Sodium fluoride and sodium fluorosilicate are made from this acid.

The question of toxicity, purity, and risk to humans from the addition of fluoride chemicals to the drinking water sometimes arises. Almost all of the over 40 water treatment chemicals that may be used at the water plant are toxic to humans in their concentrated form, e.g., chlorine gas and the fluoride chemicals are no exception. Added to the drinking water in very small amounts, the fluoride chemicals dissociate virtually 100% into their various components (ions) and are very stable, safe, and non-toxic.

Opponents of water fluoridation have argued that the silicofluorides do not completely dissociate under conditions of normal water treatment and thus may cause health problems. To counter these claims, the basic chemistry of this dissociation has been carefully reviewed. Scientists at the U.S. Environmental Protection Agency (EPA) and CDC epidemiologists have examined the research that opponents of water fluoridation cite. Both groups have concluded that these charges are not credible.

The claim is sometimes made that no health studies exist on the silicofluoride chemicals used in water fluoridation. We, the scientific community, do not study health effects of concentrated chemicals as put into water, we study the health effects of the treated water, i.e., what those chemicals become: the fluoride ion, silicates and the hydrogen ion. The health effects of fluoride have been analyzed by literally thousands of studies over 50 years and have been found to be safe and effective in reducing tooth decay. The EPA has not set any Maximum Contaminant Level (MCL) for the silicates as there is no known health concerns for them at the low concentrations found in drinking water. And, of course, the measurement of the pH of the water determines the concentration of the hydrogen ion. Many earlier papers did study the health effects of water fluoridation when the silicofluoride chemicals were used, but did not identify the silicofluorides because that was not an issue at the time. These studies have consistently shown that water fluoridation, using one of the silicofluoride chemicals, was safe to our health and effective in reducing tooth decay. Finally, many, if not most, of the numerous toxicological studies on the health effects of fluoridation were on large cities, which, because of cost, were using one of the silicofluoride chemicals.

Concern has been raised about the impurities in the fluoride chemicals. The American Water Works Association (AWWA), a well-respected water supply industry association, sets standards for all chemicals used in the water treatment plant, including fluoride chemicals. The AWWA standards are ANSI/AWWA B701-99 (sodium fluoride), ANSI/AWWA B702-99 (sodium fluorosilicate) and ANSI/AWWA B703-00 (fluorosilicic acid). The National Sanitation

Foundation (NSF) also sets standards and does product certification for products used in the water industry, including fluoride chemicals. ANSI/NSF Standard 60 sets standards for purity and provides testing and certification for the fluoride chemicals. Standard 60 was developed by NSF and a consortium of associations, including the AWWA and the American National Standards Institute (ANSI). This standard provides for product quality and safety assurance to prevent the addition of harmful levels of contaminants from water treatment chemicals. More than 40 states have laws or regulations requiring product compliance with Standard 60. NSF tests the fluoride chemicals for the 11 regulated metal compounds that have an EPA MCL. In order for a product [for example, fluorosilicic acid] to be certified to meet the NSF Standard 60, the regulated metal contaminants must be present at the tap [in the home] at a concentration of less than ten percent of the EPA MCL when added to drinking water at the recommended maximum use level. This NSF Standard 60 level [10% of the EPA MCL] is called Maximum Allowable Level (MAL). The EPA has not set any MCL for the silicates as there is no known health concerns, but Standard 60 has a MAL of 16 mg/L for sodium silicates as corrosion control agents primarily for turbidity reasons. NSF tests have shown the silicates in the water samples from public water systems that are fluoridated to be well below these levels.

In tests by NSF, the majority of samples of fluorosilicic acid showed no detectable level of arsenic in the finished water. Of those that did have a detectable level, the average arsenic concentration in the finished water was 0.43 ug/L [parts per billion]. Opflow, a monthly magazine from the AWWA, has found the arsenic level in the finished water from the fluorosilicic acid to be 0.245 ug/L [Opflow,Vol 26, No. 10, October, 2000]. The NSF Standard 60 for arsenic has a Maximum Allowable Level (MAL) of 2.5 ug/L [one half of their normal MAL] and EPA has a MCL for arsenic of 50 ug/L, although it will be lowered to 10 ug/L by 2004. As can be seen, the average arsenic is less that 1/10th of even the proposed EPA MCL and less than 1/2 the proposed NSF Standard 60 MAL of 1 ug/L.

Tests by NSF and other independent testing laboratories have shown no detectable levels of radionuclides in product samples of fluoride chemicals. There is no evidence that any of the known impurities in the fluoride chemicals have failed to meet any of these standards.

Opponents of water fluoridation have sometimes charged that "industrial grade fluoride" chemicals are used at the water plant instead of pharmaceutical grade chemicals. All the standards of AWWA, ANSI, and NSF apply to these industrial grade fluoride chemicals to ensure they are safe. Pharmaceutical grade fluoride compounds are not appropriate for water fluoridation; they are used in the formulation of prescription drugs.

Finally, it is sometimes alleged that the fluoride from natural sources, like calcium fluoride, is better than fluorides added "artificially", such as from the fluoride chemicals presently used. There is no difference. There is no reason to change the opinion of CDC that water fluoridation is safe and effective.

Thomas G. Reeves, P.E.

National Fluoridation Engineer
Program Services Branch
Division of Oral Health
National Center for Chronic Disease Prevention and Health Promotion
Centers for Disease Control and Prevention

ATTACHMENT 2

FLUORIDE IN DRINKING WATER

A SCIENTIFIC REVIEW OF EPA'S STANDARDS

Committee on Fluoride in Drinking Water

Board on Environmental Studies and Toxicology

Division on Earth and Life Studies

NATIONAL RESEARCH COUNCIL
OF THE NATIONAL ACADEMIES

THE NATIONAL ACADEMIES PRESS
Washington, D.C.
www.nap.edu

below, a narrow concentration range of 0.7 to 1.2 mg/L is recommended when decisions are made to intentionally add fluoride into water systems. This lower range also occurs naturally in some areas of the United States. Information on the fluoride content of public water supplies is available from local water suppliers and local, county, or state health departments.

Artificial

Since 1945, fluoride has been added to many public drinking-water supplies as a public-health practice to control dental caries. The "optimal" concentration of fluoride in drinking water for the United States for the prevention of dental caries has been set at 0.7 to 1.2 mg/L, depending on the mean temperature of the locality (0.7 mg/L for areas with warm climates, where water consumption is expected to be high, and 1.2 mg/L for cool climates, where water consumption is low) (PHS 1991). The optimal range was determined by selecting concentrations that would maximize caries prevention and limit enamel fluorosis, a dose-related mottling of teeth that can range from mild discoloration of the surface to severe staining and pitting. Decisions about fluoridating a public drinking-water supply are made by state or local authorities. CDC (2002a) estimates that approximately 162 million people (65.8% of the population served by public water systems) received optimally fluoridated water in 2000.

The practice of fluoridating water supplies has been the subject of controversy since it began (see reviews by Nesin 1956; Wollan 1968; McClure 1970; Marier 1977; Hileman 1988). Opponents have questioned the motivation for and the safety of the practice; some object to it because it is viewed as being imposed on them by the states and as an infringement on their freedom of choice (Hileman 1988; Cross and Carton 2003). Others claim that fluoride causes various adverse health effects and question whether the dental benefits outweigh the risks (Colquhoun 1997). Another issue of controversy is the safety of the chemicals used to fluoridate water. The most commonly used additives are silicofluorides, not the fluoride salts used in dental products (such as sodium fluoride and stannous fluoride). Silicofluorides are one of the by-products from the manufacture of phosphate fertilizers. The toxicity database on silicofluorides is sparse and questions have been raised about the assumption that they completely dissociate in water and, therefore, have toxicity similar to the fluoride salts tested in laboratory studies and used in consumer products (Coplan and Masters 2001).

It also has been maintained that, because of individual variations in exposure to fluoride, it is difficult to ensure that the right individual dose to protect against dental caries is provided through large-scale water fluoridation. In addition, a body of information has developed that indicates

ATTACHMENT 3

Excerpts from: http://www.cdc.gov/fluoridation/fact_sheets/engineering/wfadditives.htm#8m

Home | About CDC | Press Room | A-Z Index | Contact Us

CDC Department of Health and Human Services
Centers for Disease Control and Prevention

CDC en Español

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Community Water Fluoridation

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Oral Health Home > Community Water Fluoridation Home > Fact Sheets

View by Topic

Water Fluoridation Additives

Sources of Fluoride Additives

Most fluoride additives used in the United States are produced from phosphorite rock. Phosphorite is used primarily in the manufacture of phosphate fertilizer. Phosphorite contains calcium phosphate mixed with limestone (calcium carbonates) minerals and apatite—a mineral with high phosphate and fluoride content. It is refluxed (heated) with sulfuric acid to produce a phosphoric acid-gypsum (calcium sulfate-$CaSO_4$) slurry.

The heating process releases hydrogen fluoride (HF) and silicon tetrafluoride (SiF_4) gases which are captured by vacuum evaporators. These gases are then condensed to a water-based solution of 23% FSA with the remainder as water.

Approximately 95% of FSA used for water fluoridation comes from this process. The remaining 5% of FSA is generated during the manufacture of hydrogen fluoride or from the use of hydrogen fluoride in the manufacturing of solar panels and electronics.

Since the early 1950s, FSA has been the chief additive used for water fluoridation in the United States. The favorable cost and high purity of FSA make it a popular source. Sodium fluorosilicate and sodium fluoride are dry additives that come largely from FSA.

FSA can be partially neutralized by either table salt (sodium chloride) or caustic soda to get sodium fluorosilicate. If enough caustic soda is added to neutralize the fluorosilicate completely, it results in sodium fluoride. Sodium fluoride is also produced by mixing caustic soda with hydrogen fluoride, although approximately 90% of the sodium fluoride used in the United States comes from FSA.

How common are shortages or disruptions of fluoride products?

Shortages or disruptions of fluoride product deliveries are not common. However, there have been periods of shortages and disruptions resulting in difficulties obtaining fluoride additives for water fluoridation. Most shortages and disruptions tend to be of short duration, on the order of several weeks. Shortages or disruptions are usually regional. Fluoride products are produced in only a few areas of the country, and then must be transported to regional depots, typically by rail tanker car. Therefore, there may be sufficient fluoride products nationally, but a particular region may have shortages or disruptions. Shortages or disruptions can also result from inclement weather in fluoride-producing areas. Florida is the largest producer of fluoride products, and hurricanes or other severe weather events can cause phosphate fertilizer manufacturers to suspend operations for several weeks at a time. Seasonal disruptions, such as manufacturing plant maintenance periods, also may delay operations in entire production facilities for weeks to months at a time. Because the supply of fluoride products is related to phosphate fertilizer production, fluoride product production can also fluctuate depending on factors such as unfavorable foreign exchange rates and export sales of fertilizer. Other causes of fluoride shortages have been phosphorite rock ore quality with lower fluoride yields, labor disputes involving the rail or truck transport industry, and other causes.

ATTACHMENT 4

The Register Guard
07/27/2004

Oregonians long skeptical of fluoridation

By Winston Ross

Today, less than a quarter of Oregon residents drink fluoridated water. Only two other states have lower percentages of use.

Despite the fervent efforts of dentists to persuade water districts and city councils to add the substance, the chemical additive is in decline. Portland is the largest city in the United States without fluoridated water.

Some states have passed laws mandating fluoride in all public drinking water systems. In Oregon, such an effort failed to make it out of a legislative committee in 2001 and hasn't been attempted since.

Still, dentists in some of the state's cities remain undaunted.

In 2000, a Scappoose dentist convinced city councilors to add fluoride to the drinking water. In November 2002, citizens in Beaverton passed a measure to add fluoride to the city's water, and two weeks later, the Tualatin Valley Water District - which covers 170,000 residents in Beaverton, Hillsboro and Aloha - decided to add the substance.

Currently, dentists in Medford are working to gather signatures to add fluoride to that city's water, but they haven't gotten enough support after a year and a half of trying.

Nationally, the debate has played out a thousand times since cities across America took the advice of public health officials and started pumping fluoride - a byproduct of industrial waste - into municipal water systems.

If pharmaceutical fluoride is good for the teeth, the government reckoned, so must be the fluoride created from the mining of phosphate ore - which emits fluoride as the ore is cooked for use in the phosphate fertilizer industry. Another fluoride source comes from the production of aluminum.

But some people didn't trust the notion that this kind of fluoride ingestion had the same benefits as the stuff the dentist smears on teeth. For one thing, industrial fluoride has been shown to accompany harmful substances such as arsenic, even after it's diluted in the water. In 2000, a union of 200 Environmental Protection Agency scientists, lawyers, engineers and other professionals called for a nationwide moratorium on the addition of fluoride to public drinking water.

The group cited studies that linked fluoride to cancer in lab rats, weakening of bone density in older Americans and a growing number of citizens suffering from fluorosis, a condition that causes yellowing of the teeth after overexposure to fluoride, said William Hirzy, a senior scientist with the EPA's risk assessment division since 1981.

The group believes that the government is sticking to outdated theories about fluoride and ignoring new science that shows the dangers of fluoride, Hirzy said in an interview.

"What you have is the government investing its credibility - prematurely and erroneously," he said, "and now, having done that, it's very difficult to say, 'You know what we said 60 years ago? It's not really so.' It's amazing to me that we persist in this practice."

What's amazing to dentists is that people would question the long-standing practice.

According to the American Dental Association, research about the beneficial effects of fluoride dates to the early 1900s, when a young dentist named Frederick McKay opened a practice in Colorado Springs, Colo., and discovered that many local residents had strange brown stains on their permanent teeth.

McKay and another dentist discovered the cause to be mottled enamel, which is known today as fluorosis.

But McKay noted that these teeth, however stained, were surprisingly resistant to decay, thanks to high levels of naturally occurring fluoride in the drinking water.

That led to a series of studies and the first community water fluoridation program, in Grand Rapids, Mich., in 1945. The ADA claims water fluoridation can reduce the amount of cavities children get in their baby teeth by as much as 60 percent; it can reduce tooth decay in permanent adult teeth by nearly 35 percent.

"The opposition will say it's toxic waste of the phosphate fertilizer industry," said Kurt Ferre, a Portland dentist who has led fluoridation efforts in different parts of the state. "It's a useful byproduct of the phosphate fertilizer industry.

"If you look at the side of a soda can, the fourth ingredient is phosphoric acid - that too is a byproduct of the phosphate fertilizer industry."

While Ferre says it's "difficult to quantify" whether states such as Oregon suffer higher rates of cavities, he argues that states with low fluoridation rates show a greater disparity in dental health between rich and poor citizens. Those with adequate dental benefits or money can afford fluoride treatments and don't have problems as a result. Those who can't afford it have higher cavity rates.

"From a public health standpoint, it's a benefit to all members of the community," Ferre said. "It doesn't discriminate on the basis of race, status, religion or age."

ATTACHMENT 5

June 2012

NSF Fact Sheet on Fluoridation Chemicals

Introduction

This fact sheet provides information on the fluoride containing water treatment additives that NSF has tested and certified to NSF/ANSI Standard 60: Drinking Water Chemicals - Health Effects. According to the latest Association of State Drinking Water Administrators Survey on State Adoption of NSF/ANSI Standards 60 and 61, 47 U.S. states require that chemicals used in treating potable water must meet Standard 60 requirements. If you have questions on your state's requirements, or how the NSF/ANSI Standard 60 certified products are used in your state, you should contact your state's Drinking Water Administrator.

Water fluoridation is the practice of adjusting the fluoride content of drinking water. Fluoride is added to water for the public health benefit of preventing and reducing tooth decay and improving the health of the community. The U.S. Centers for Disease Control and Prevention is a reliable source of information on this important public health intervention. For more information please visit www.cdc.gov/fluoridation/.

NSF certifies three basic products in the fluoridation category:

1. Fluorosilicic Acid (aka Fluosilicic Acid or Hydrofluosilicic Acid).
2. Sodium Fluorosilicate (aka Sodium Silicofluoride).
3. Sodium Fluoride.

NSF Standard 60

Products used for drinking water treatment are evaluated to the criteria specified in NSF/ANSI Standard 60. This standard was developed by an NSF-led consortium, including the American Water Works Association (AWWA), the American Water Works Association Research Foundation (AWWARF), the Association of State Drinking Water Administrators (ASDWA), and the Conference of State Health and Environmental Managers (COSHEM). This group developed NSF/ANSI Standard 60, at the request of the US EPA Office of Water, in 1988. The NSF Joint Committee on Drinking Water Additives continues to review and maintain the standard annually. This committee consists of representatives from the original stakeholder groups as well as other regulatory, water utility and product manufacturer representatives.

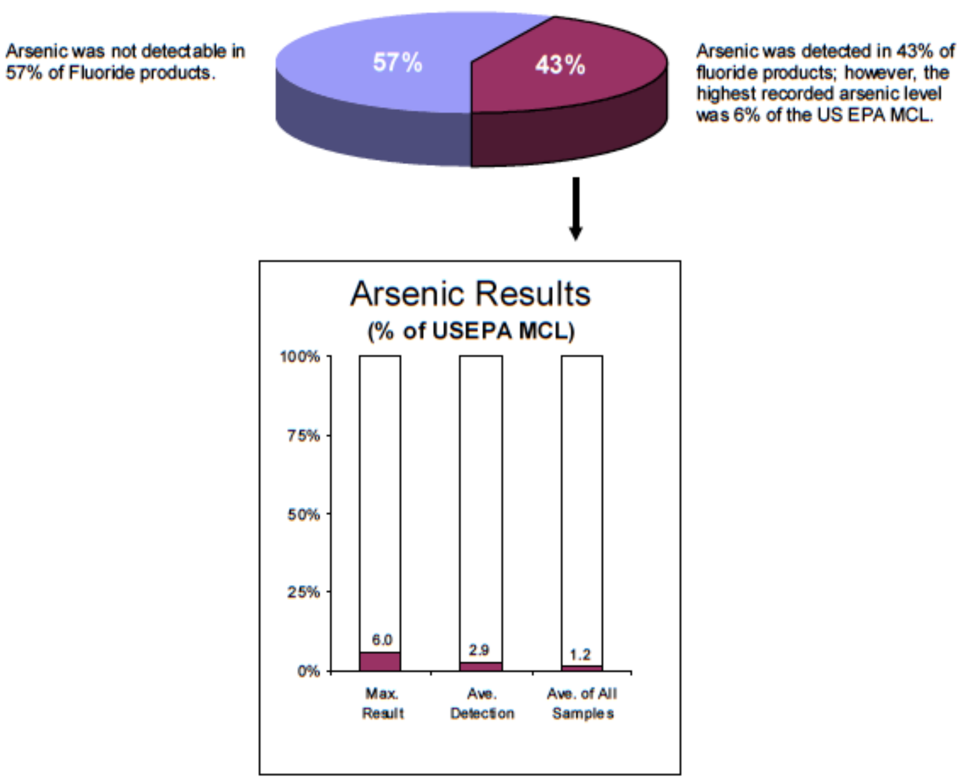
Standard 60 was developed to establish minimum requirements for the control of potential adverse human health effects from products added directly to water during its treatment, storage and distribution. The standard requires a full formulation disclosure of each chemical ingredient in a product. The standard requires testing of the treatment chemical products, typically by dosing these in water at 10 times the maximum use level, so that trace levels of contaminants can be detected. An evaluation of test results is required to determine if any contaminant concentrations have the potential to cause adverse human health effects. The standard sets criteria for the establishment of single product allowable concentrations (SPAC) of each respective contaminant. For contaminants regulated by the U.S. EPA, this SPAC has a default level not to exceed ten-percent of the regulatory level to provide protection for the consumer in the unlikely event of multiple sources of the contaminant, unless a lower or higher number of sources can be specifically identified. To address the health effects of the substances, Standard 60 requires that if EPA has not established a Maximum Contaminant Level for a substance, then the toxicology review and evaluation procedures contained in Annex A of NSF 60 should be followed to establish a SPAC.

effectiveness of NSF/ANSI Standard 60 and the NSF certification program for drinking water treatment additives, and demonstrates the effectiveness of the program. The reduction in impurities is further attested to by an article in the Journal of the American Water Works Association entitled, "Trace Contaminants in Water Treatment Chemicals."[1]

Arsenic

The results in Table 1 indicate that the most common contaminant detected in these products is arsenic, which is detected in 43% of the product samples. This means that levels of arsenic in 57% of the samples were non-detectable. Products were tested at 10 times their maximum use level in accordance to NSF/ANSI Standard 60. All detections were at levels below the Single Product Allowable Concentration (SPAC) if the product is added to drinking water at (or below) its maximum use level. The SPAC, as defined in NSF/ANSI Standard 60, is one tenth of the US EPA's MCL. The current MCL for arsenic is 10 ppb, the highest detection of arsenic from a fluoridation chemical was 0.6 ppb (shown on Table 1), and the average concentration was 0.12 ppb. The highest concentration of 0.6 ppb was detected because NSF/ANSI standard 60 requires testing the chemical at 10 times its maximum use level to detect these trace levels of contaminants.

Figure A

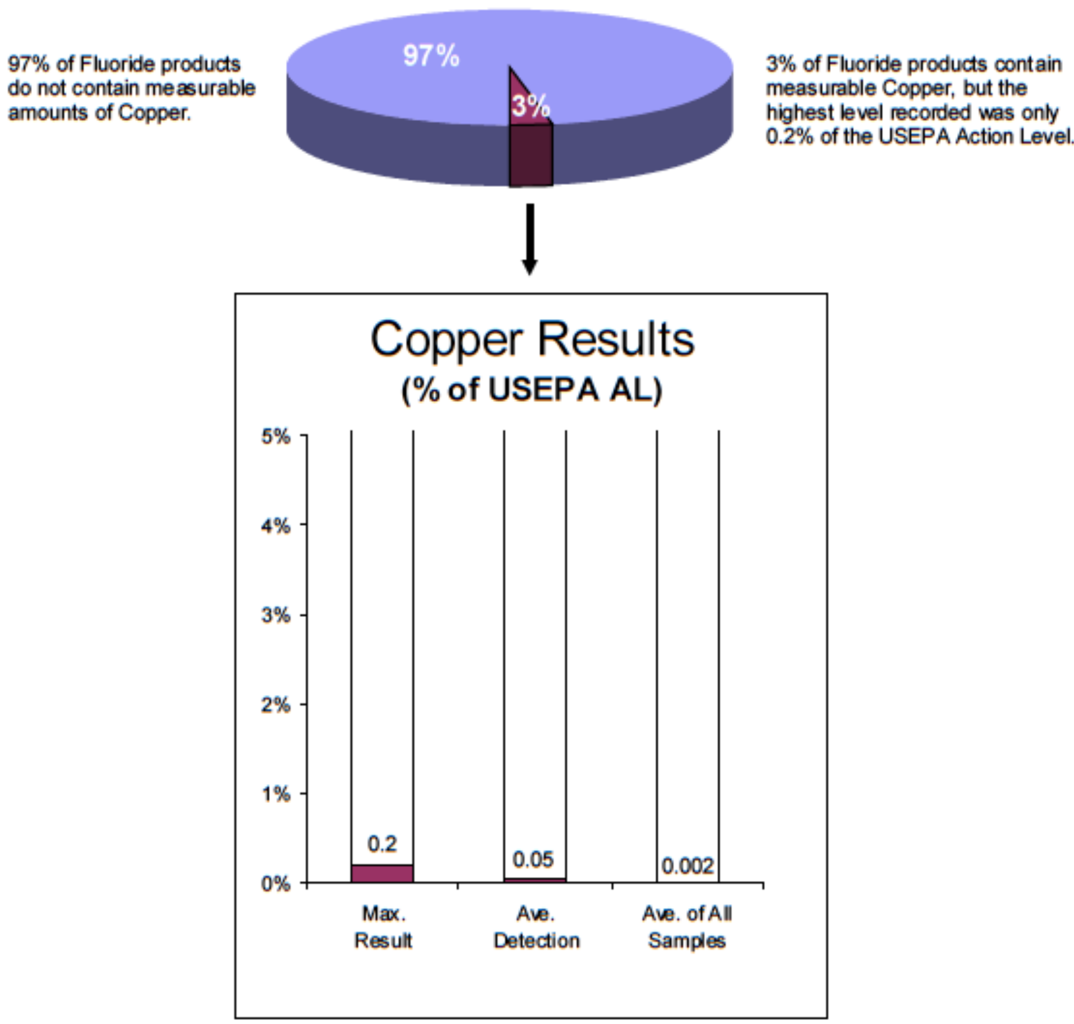


[1] Brown, R., et al., "Trace Contaminants in Water Treatment Chemicals: Sources and Fate." Journal of the American Water Works Association 2004: 96:12:111.

Copper

The second most common contaminant found, and on a much less frequent basis, is copper, and 97% of all samples tested had no detectable levels of copper. The average concentration of copper has been 0.02 ppb with 2.6 ppb being the highest concentration detected. This is well below the 130 ppb SPAC requirement of NSF 60.

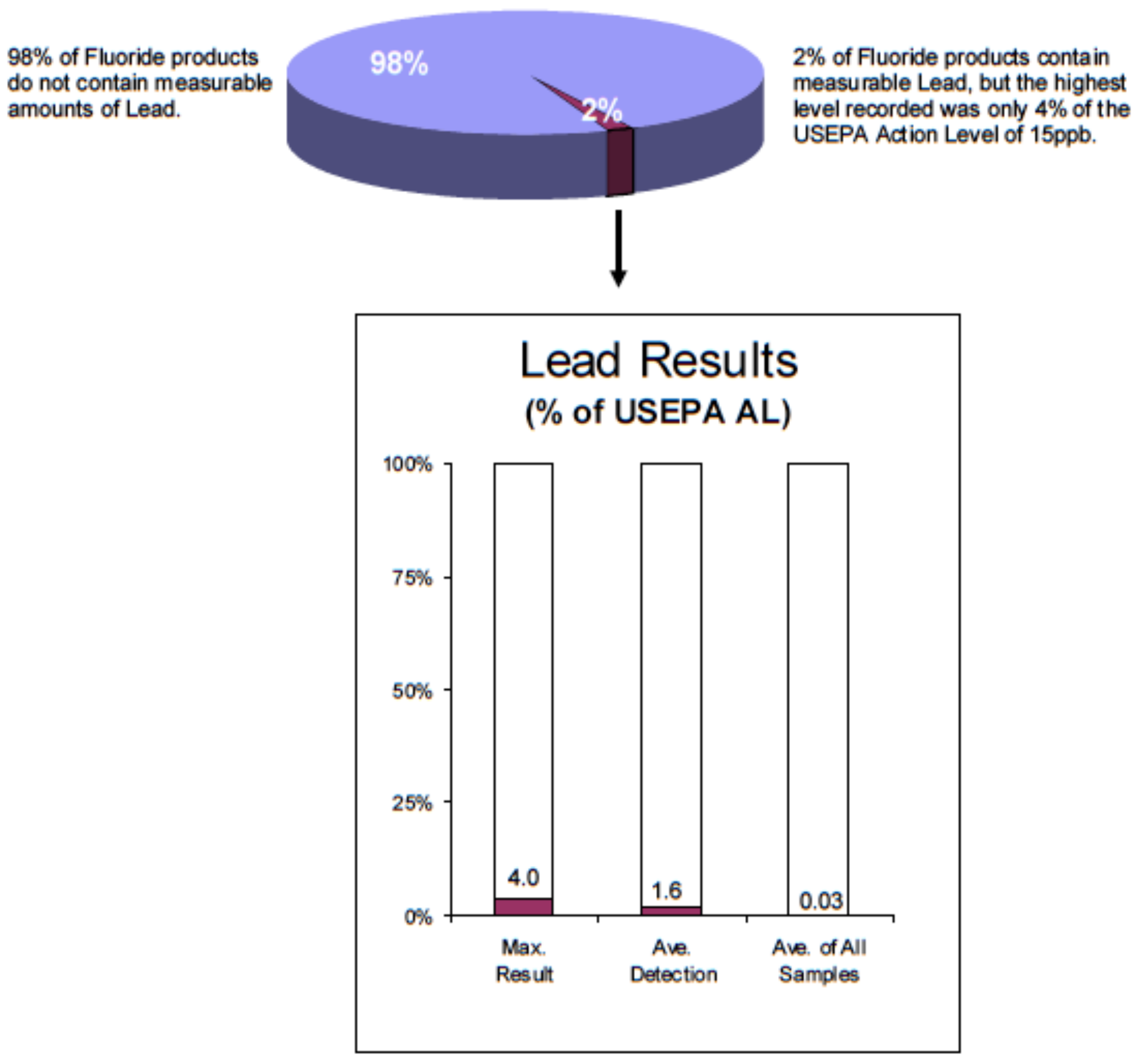
Figure B



Lead

The third most common contaminant found is lead. It occurs on a much less frequent basis, and 98% of all samples tested had no detectable levels of lead. The average concentration of lead has been 0.005 ppb with 0.6 ppb being the highest concentration detected. This is well below the 1.5 ppb SPAC requirement of NSF 60.

Figure C



Radionuclides
Fluoridation products are also tested for radionuclides. All samples tested have not had any detectable levels of alpha or beta radiation.

Summary
In summary, the majority of fluoridation products as a class, based on NSF test results, do not add measurable amounts of arsenic, lead, other heavy metals, or radionuclide contamination to drinking water.

Additional information on fluoridation of drinking water can be found on the following web sites:

American Water Works Association (AWWA) Fluoridation Chemical Standards
http://www.awwa.org/Bookstore/producttopicsresults.cfm?MetaDataID=121&navItemNumber=5093

American Water Works Association (AWWA) position
http://www.awwa.org/Advocacy/pressroom/fluoride.cfm

American Dental Association (ADA) http://www.ada.org/public/topics/fluoride/index.asp

U.S. Centers for Disease Control and Prevention (CDC) http://www.cdc.gov/fluoridation

Table 1

	Percentage of Samples with Detectable Levels	Mean Contaminant Concentration in all samples (ppb)	Mean Contaminant Concentration in detectable samples (ppb)	Maximum Contaminant Concentration in detectable samples (ppb)	NSF/ANSI Standard 60 Single Product Allowable Concentration	US EPA Maximum Contaminant or Action Level
Antimony	0%	ND	ND	ND	0.6	6
Arsenic	43%	0.12	0.29	0.6	1	10
Barium	<1%	0.001	0.3	0.3	200	2000
Beryllium	0%	ND	ND	ND	0.4	4
Cadmium	1%	0.001	0.08	0.12	0.5	5
Chromium	<1%	0.001	0.15	0.2	10	100
Copper	3%	0.02	0.68	2.6	130	1300
Lead	2%	0.005	0.24	0.6	1.5	15
Mercury	<1%	0.0002	0.04	0.04	0.2	2
Radionuclides – alpha pCi/L	0%	ND	ND	ND	1.5	15
Radionuclides – beta mrem/yr	0%	ND	ND	ND	0.4	4
Selenium	<1%	0.016	1.95	3.2	5	50
Thallium	<1%	0.0003	0.04	0.06	0.2	2

While the attachments here include quoted excerpts of the referenced documents, we encourage reading of the complete documents referenced here.

REFERENECES

[1] "Fluoride group secures second vote on Portland City Council for $5 million project," by Brad Schmidt, Oregonian. August 16, 2012. (see online at: http://www.oregonlive.com/portland/index.ssf/2012/08/fluoride_group_secures_second.html

[2] http://www.cdc.gov/fluoridation/fact_sheets/engineering/wfadditives.htm#2

[3] Thomas Reeves, National Fluoridation Engineer, U.S. Center for Disease Control. The Manufacture of The Fluoride Chemicals, Refer: FL-143 (see online: www.cdphe.state.co.us/pp/oralhealth/fluoridation/fl-143.pdf)

[4] Fluoride in Drinking Water, National Research Council of the National Academy of Sciences, Committee on Fluoride in Drinking Water Board on Environmental Studies and Toxicology, Division on Earth and Life Studies, National Academies Press, at p. 15 (2006), (download online at http://www.nap.edu/catalog.php?record_id=11571)

[5] http://www.cdc.gov/fluoridation/fact_sheets/engineering/wfadditives.htm#2

[6] http://thetoothofthematter.org/fluoride-nature-thought-of-it-first/

[7] Oregonians Long Skeptical of Fluoridation. The Register-Guard, July 27, 2004; page C1 (see online: http://www.fluoridealert.org/Alert/United-States/Oregon/Oregonians-long-skeptical-of-fluoridation.aspx)

[8] NSF Fact Sheet on Fluoridation Chemicals, June 2012, as cited and linked to by U.S. Centers for Disease Control website, Water Fluoridation Additives, Measured Levels of Impurities. *See* http://www.cdc.gov/fluoridation/fact_sheets/engineering/wfadditives.htm#2

[9] The NSF sets standards for fluoridation chemicals and other water additives. See CDC link to NSF study results and fact sheet at http://www.cdc.gov/fluoridation/fact_sheets/engineering/wfadditives.htm#2

[10] NSF Fact Sheet on Fluoridation Chemicals, at p. 4, June 2012, as cited and linked to by U.S. Centers for Disease Control website, Water Fluoridation Additives, Measured Levels of Impurities. http://www.cdc.gov/fluoridation/fact_sheets/engineering/wfadditives.htm#2

[11] While EPA weakens the health based MCLGs after considering the economic costs of removing such contaminants to obtain EPA's enforceable Maximum Contaminant Levels(MCLs), which are 15 parts per billion for lead and 10 parts per billion for arsenic, these numbers represent an economic based compromise but do not support that knowingly *adding* concentrations of arsenic or lead above is somehow safe. http://water.epa.gov/drink/contaminants/basicinformation/arsenic.cfm; http://water.epa.gov/drink/contaminants/basicinformation/lead.cfm

[12] While EPA weakens the health based MCLGs after considering the economic costs of removing such contaminants to obtain EPA's enforceable Maximum Contaminant Levels(MCLs), which are 15 parts per billion for lead and 10 parts per billion for arsenic, these numbers represent an economic based compromise but do not support that knowingly *adding* concentrations of arsenic or lead above is somehow safe. http://water.epa.gov/drink/contaminants/basicinformation/arsenic.cfm; http://water.epa.gov/drink/contaminants/basicinformation/lead.cfm

[13] http://water.epa.gov/drink/contaminants/basicinformation/arsenic.cfm

[14] EPA explains the difference between MCLs and MCLGs stating, "MCLs are set as close to the health goals [MCLGs] as possible, considering cost, benefits and the ability of public water systems to detect and remove contaminants using suitable treatment technologies." http://water.epa.gov/drink/contaminants/basicinformation/arsenic.cfm

[15] http://water.epa.gov/drink/contaminants/basicinformation/arsenic.cfm

[16] http://water.epa.gov/drink/contaminants/basicinformation/lead.cfm

[17] NSF Fact Sheet on Fluoridation Chemicals, at p. 4, June 2012, as cited and linked to by U.S. Centers for Disease Control website, Water Fluoridation Additives, Measured Levels of Impurities.
http://www.cdc.gov/fluoridation/fact_sheets/engineering/wfadditives.htm#2

[18] NSF Fact Sheet on Fluoridation Chemicals, at p. 5, 6, June 2012, as cited and linked to by U.S. Centers for Disease Control website, Water Fluoridation Additives, Measured Levels of Impurities.
http://www.cdc.gov/fluoridation/fact_sheets/engineering/wfadditives.htm#2

[19] Pollick, HF, "Water Fluoridation and the Environment: Current Perspective in the United Int J Occup Environ Health, 10:343-350, 346 (2004) stating, "Following dilution with water, the calculated range of arsenic concentrations in the finished water contributed by fluorosilicic acid feed is 0.10 to 0.24 μg/L (parts per billion, ppb)."