

# **Petition under the Auditor General Act to Discontinue Water Fluoridation**

Petition regarding the additions of fluoridation chemicals which have never been tested for safety or efficacy and are deemed toxic substances according to CEPA, Schedule 1

These additions are not effective in the prevention of cavities and are environmental and human health hazards in violation of the Fisheries Act 36(3)

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Commissioner of the Environment and Sustainable Development  
Attention: Petitions  
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1-888-761-5953 (toll free) Ext 2923**

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# 1. Introduction



Photo: [www.fluoridealert.org](http://www.fluoridealert.org)

## ***The reasons for water fluoridation are no longer valid***

The original reason for fluoridating water – to prevent cavities – is no longer valid.

According to research from around the world, swallowing fluoride at concentrations found in our water has no significant effect on reducing cavities.

Fluoride applied directly to the tooth surface, at concentrations many orders of magnitude higher than in drinking water, may be effective in preventing cavities.

Concentrations of fluoride found in fluoridated water are simply insufficient to provide any significant topical benefit.

## ***Fluoridated water causes health problems***

At current concentrations, fluoridated water is causing many health problems in susceptible individuals, especially young children. The most common form of fluoride in drinking water, hydrofluorosilicic acid, is classified by the U.S. Environmental Protection Agency as a Class 1 Hazardous Waste.

Certain members of society develop teeth, bone, skin, thyroid, reproductive, gastro-intestinal, neurological and pancreatic problems, which are associated with fluorides in drinking water.

## ***Fluoridated water is toxic to pets, fish and wildlife***

The Canadian Environmental Protection Agency and the U.S. Department of Health and Human Services both list (inorganic) fluoride as a toxin which is damaging to plant and animal health.

Fluoridated water effluent from municipal and industrial sources enters ponds, rivers, lakes and oceans, harming many species of fish and animals that drink this water. Damage to fisheries on the west coast prompted some authorities to stop fluoridating their water.

## ***Public Policy is lagging behind the scientific evidence***

The purpose of this report is to inform policymakers about the current state of knowledge. The products most commonly put into our drinking water (hydrofluorosilicic acid and sodium silicofluoride) have never been tested for safety or efficacy. Additions of these toxic substances into our drinking water should be stopped.

## 2. Background Information

### *What are we putting into our water?*

The Office of the Chief Dental Officer (Health Canada) has stated that fluoride is a passive element, and is naturally found in water<sup>1</sup>. Fluoride does occur naturally, and comes from many sources. The most common form of water fluoridation however, uses hydrofluorosilicic acid, an industrial waste which is not naturally occurring, and is extremely reactive<sup>2,3</sup>.

Hydrofluorosilicic acid is a by-product of emissions from the phosphate fertilizer industry<sup>4</sup>. These emissions are regulated by the U.S. Environmental Protection Agency (US EPA) and other government agencies because they contain many environmental pollutants<sup>5</sup>.

The fertilizer industry now removes contaminants from their smoke stack emissions to prevent them from being released into the atmosphere<sup>6</sup>.

However, industries are left with the problem of disposal of the removed contaminants. The next step is to separate the slurry of contaminants into different chemical classes which can be resold or disposed of in a legal manner.



Photo: [www.fluoridealert.org](http://www.fluoridealert.org)

### *The solution to pollution is dilution*

For the phosphate industry, a solution containing 23% hydrofluorosilicic acid is extracted. However, this solution is often contaminated with arsenic, lead, mercury, chromium, cadmium, hydrogen fluoride and barium (see attached Certificate of Analysis). An analysis of hydrofluorosilicic acid in Alberta found the following heavy metal concentrations:

<b>Arsenic</b>	57	mg/L
<b>Lead</b>	3	mg/L
<b>Mercury</b>	0.01	mg/L
<b>Chromium</b>	0.1	mg/L

Since the advent of water fluoridation, municipalities have been an important customer for these industries, buying fluoride-containing solutions to add to drinking water.

Dwindling supplies of fluorosilicates used in water fluoridation means that the replacement product could be shipped to us from China (see quote page 31).

“In regard to the use of fluosilicic acid as a source of fluoride for fluoridation, this Agency [US EPA] regards such use as an ideal environmental solution to a long-standing problem. By recovering by-product fluosilicic acid from fertilizer manufacturing, water and air pollution are minimized, and water utilities have a low-cost source of fluoride available to them.” Rebecca Hanmer, Deputy Assistant Administrator for Water, US EPA, 30 March 1983.

Essentially, we are removing pollution from the air (where it contaminates areas surrounding smoke stacks) and putting it into our water (where it is more effectively diluted). The fact remains that we are still adding toxic chemicals to our water. Is this beneficial, legal or ethical?

**"If this stuff gets out into the air, it's a pollutant; if it gets into the river, it's a pollutant; if it gets into the lake, it's a pollutant; but if it goes right straight into your drinking water system, it's not a pollutant. That's amazing!"** Dr. Hirzy 2000 Senior Vice-President of EPA Headquarters Union. <http://www.fluoridealert.org/phosphate/overview.htm>

## ***Where does the fluoride in our water go?***

Fluoridated water is used in households, agriculture, industry, and is released into our environment from all of these sources. Effluent from sewage treatment plants is especially important, because sewage is discharged directly into rivers, lakes and oceans.

Sewage biosolids are sometimes spread on agricultural fields. Accumulation of heavy metals found in fluoridated water becomes sediment in rivers/streams/lakes



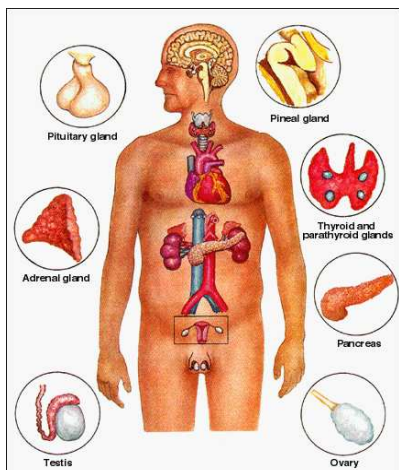
Photo: [www.fluoridealert.org](http://www.fluoridealert.org)

## ***What does fluoride do to our environment?***

Fluoride, at the concentrations found in drinking water, kills many species of fresh and saltwater fish, shellfish and insects. Wild animals, livestock and pets develop health problems similar to humans from ingesting fluoridated water<sup>7-11,117-119</sup>.

Fluoridating chemicals are very persistent – they do not break down when released into the environment. They accumulate in bodies of water and in plants and animals.

## ***What does fluoride do to our bodies?***



Swallowing hydrofluorosilicic acid and other chemicals used in water fluoridation can damage:

- Teeth
- Bones
- Thyroid
- Reproductive organs
- Gastrointestinal system
- Brain

These ubiquitous chemicals have also been linked to cancer, ADHD, Alzheimer's disease and Down syndrome (see NRC 2006 Report).

Picture: [www.fluoridealert.org](http://www.fluoridealert.org)

### 3. Evidence that the Reasons for Fluoridation are No Longer Valid

#### *How does fluoride work?*

Since the beginning of its use, it has been assumed that fluoride needed to be swallowed in order to work: fluoride would enter the body and then be incorporated into tooth enamel, which would make teeth stronger.

This assumption was made, because; a) fluoride had been detected in tooth enamel; b) and at the same time, there was a measured decrease in dental cavities through much of the twentieth century (see page 8). As a result, a positive association was made between dental health and the presence of fluoride in tooth enamel.

What was not understood, was that fluoride incorporation was simply a result of exposure to fluoride in the environment, through environmental contamination<sup>7-11</sup>.

Based on recent scientific research, fluoride is believed to improve dental health through topical mechanisms only (i.e. not through ingestion). In other words, fluoride is believed to work not by being incorporated into tooth enamel, but by working on the tooth's surface<sup>12-20</sup>.

**Our understanding of fluoride in relation to dental health has been based on assumptions only, with no real evidence for cause and effect**

“Fluoride’s caries-preventive properties initially were attributed to changes in enamel during tooth development because of the association between fluoride and cosmetic changes in enamel and a belief that fluoride incorporated into enamel during tooth development would result in a more acid-resistant mineral. However, laboratory and epidemiologic research suggests that fluoride prevents dental caries predominately after eruption of the tooth into the mouth, and its actions primarily are topical for both adults and children.” Centers for Disease Control; *MMWR Weekly Report*. 1999;48:933-940.

The currently hypothesized modes of action for topical fluoride are as follows:<sup>12</sup>

- Destroys bacteria (by destroying enzymes) that contribute to tooth decay
- Helps to rebuild enamel
- Helps to prevent destruction of enamel

Although fluoride in water contacts the surface of teeth (i.e. is applied topically), the concentrations of fluoride in water are insufficient. Beneficial effects of topical fluoride occur at concentrations many orders of magnitude higher (1000 – 1500 mg/L) than concentrations found in drinking water (0.8 – 1.0 mg/L)<sup>12,16</sup>. Additionally, 80 – 90% of cavities occur in the pits and fissures of teeth, where fluoride in water is ineffective<sup>21-25</sup>.

It is now known that increasing fluoride levels in tooth enamel does not prevent cavities. Swallowing fluoride, at recommended doses, is not effective for the prevention of tooth decay.

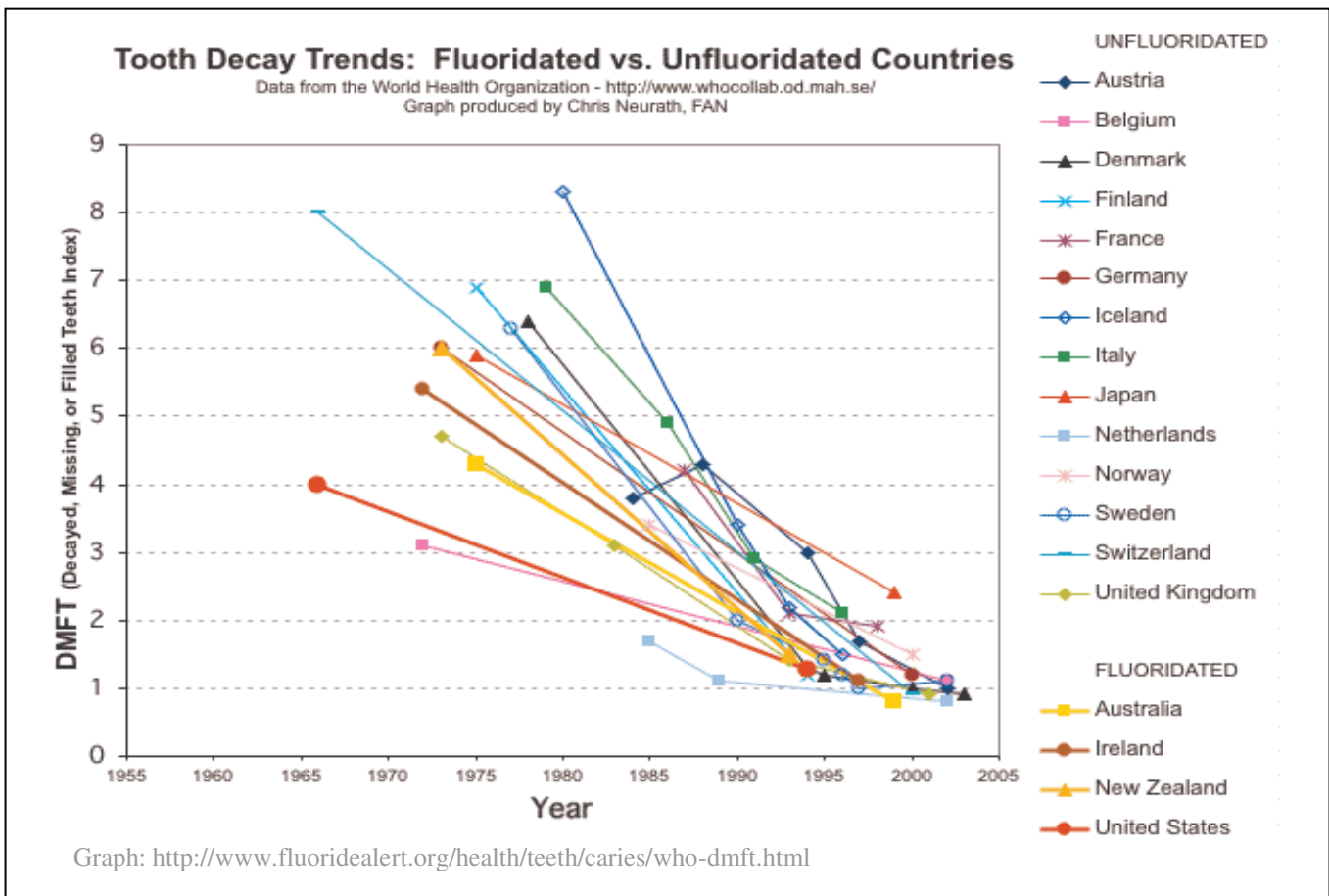
## Water fluoridation and incidence of dental cavities

For many decades, we've seen a decline in the incidence of dental cavities in more affluent members of society (see below). However, there has been no significant change in the incidence of cavities in lower socioeconomic groups over the same time period, despite equal access to fluoridated water.



“Large reductions in caries [have] been occurring in unfluoridated areas. The magnitudes of these reductions are generally comparable with those observed in fluoridated areas over similar periods of time.” *Nature*; 1986; vol 322; p. 125-129.

Another argument used to support the use of water fluoridation is the incidence of ‘baby bottle tooth decay’ (BBTD), which is most prevalent among certain socioeconomic groups. It was believed that water fluoridation would reduce the incidence of BBTD, but recent research shows that rates of BBTD are highest among the urban poor, irrespective of access to fluoridated water<sup>26-29</sup>.



“The current reported decline in caries in the US and other Western industrialized countries has been observed in both fluoridated and nonfluoridated communities, with percentage reductions in each community apparently about the same.” Gilbert JA. 1988 *Ethics and Esthetics. Journal of the American Dental Association* 117(3): 490-495.

## 2007 Professional Statement

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In 2007, Fluoridealert.org released a Professional Statement from over 1,100 organizations and/or professionals around the world, requesting the discontinuation of water fluoridation. Those signing the Professional Statement include <http://www.FluorideAction.net>:

- 2 members of the advisory panel for the York Review 2000 (Dr. Peter Mansfield and Dr. Sheila Gibson)
- 3 members of the 2006 National Research Council panel (Dr. Bob Isaacson, Dr. Hardy Limeback, Dr. Kathleen Thiessen)
- Nobel Laureate Arvid Carlsson
- International Academy of Oral Medicine and Toxicology
- International Society of Doctors for the Environment (ISDE)
- American Academy of Environmental Medicine
- Asociacion Argentina de Medicos por el Medio Ambiente, Argentina
- Irish Doctors' Environmental Association

## 2007 Pizzo Review

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The most recent review of worldwide water fluoridation suggests that water fluoridation is largely ineffective.

### 1. The benefits of fluoride are largely topical not systemic

"It is now accepted that systemic fluoride plays a limited role in caries prevention."

### 2. Water fluoridation may be unnecessary

"Several studies conducted in fluoridated and nonfluoridated communities suggested that this method of delivering fluoride may be unnecessary for caries prevention, particularly in the industrialized countries where the caries level has become low."

### 3. Interruption of water fluoridation does not increase dental decay.

"In the past decades, a number of authors focused their attention on caries trend of the communities that interrupted water fluoridation in comparison to communities without water fluoridation (Kuopio and Jyvaskyla, Finland; Chemnitz and Plauen, Germany; Tiel and Culemborg, Holland; La Salud, Cuba). In these communities, during the years of water fluoridation, a caries reduction had been observed, but after the cessation, caries prevalence did not rise, remained almost the same or even decreased further. These findings do indicate that the interruption of CWF [community water fluoridation] had no negative effects on caries prevalence."

### 4. Water fluoridation does not reduce social inequalities

"To date, there is limited evidence to support the view that fluoridation reduced the [social] disparities in caries."

Giuseppe Pizzo, Maria Piscopo, Ignazio Pizzo and Giovanna Giulliana. 2007 Community water fluoridation and caries prevention: a critical review. *Clinical and Oral Investigations*. Sep;11(3):189-193.

## Newburgh-Kingston Trial

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One of the four original water fluoridation trials in the world was conducted in New York. The city of Newburgh was fluoridated, while the city of Kingston was not fluoridated. A study was conducted 50 years later, with the following results:

- More cavities in the fluoridated community vs the non-fluoridated community:

"Among 7-14 year old lifelong residents of fluoridated Newburgh, New York, mean number of decayed, missing and filled permanent teeth exceeded that of non fluoridated Kingston, New York."

- Higher incidence of dental fluorosis in fluoridated community;
- Increased bone fracture in fluoridated community

Kumar JV, Swango PA. 1999 Fluoride exposure and dental fluorosis in Newburgh and Kingston, New York: policy implications. *Community of Dentistry and Oral Epidemiology* Jun;27(3):171-80.

## 2007 Caledon-Brampton Study

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A comparison was made between 7-year-old children of Caledon, with unfluoridated water, and the children of Brampton, with fluoridated water. Over 1,000 children in 25 schools were surveyed for the incidence of dental cavities



The study concluded that "The effect of fluoridation on caries in these communities was not evident"

Factors that did affect the incidence of dental cavities were:

- dental hygiene
- nutrition
- use of dental sealants
- breast feeding vs infant formulas
- country of birth

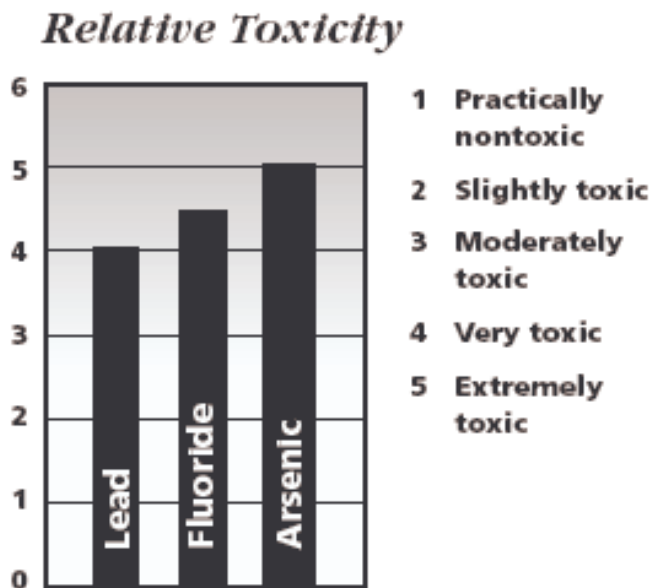


Caledon [Not Fluoridated] - Brampton [Fluoridated] Study: D. ITO, 2007 Determinants of caries in adjacent fluoridated and non-fluoridated cities. The IADR/AADR/CADR 85th General Session and Exhibition (March 21-24, 2007)

## 4. Evidence of Fluoride Toxicity

Hydrofluorosilicic acid (used in water fluoridation) is an inorganic fluoride. According to the Gosselin 1983 Clinical Toxicology Textbook, inorganic fluorides are more toxic than lead, and less toxic than arsenic, as illustrated by the following bar chart. This is based on LD50 data [concentration needed to achieve lethal dose with 50% of test subjects] LD50 data from Robert E. Gosselin et al, Clinical Toxicology of Commercial Products 5th ed., 1984.

The toxicology of fluoride products indicate they are very toxic. Associated contaminants lead, arsenic, mercury etc, are also very to extremely toxic.



Note that the Maximum Allowable Contaminant level (MAC) of fluoride has been set by Health Canada regulations to be 2 orders of magnitude higher than other comparable toxic contaminants such as arsenic and lead. Such regulation affords a tolerance for this contaminant, which appears unjustified. The government policies regarding this product suggests a lack of awareness as to this product's true toxicity

- MAC of **lead** 15 ppb
- MAC of **fluoride** 1,500 ppb
- MAC of **arsenic** 10 ppb

The Canadian Environmental Protection

Agency (CEPA) defines a "**Toxic Substance**":

1. persistence [ability to be destroyed]
2. bioaccumulation [accumulation in biological systems]
3. toxicity [dangerous immediate or long-term health effects]
4. predominantly anthropogenic [used or released as a result of human activity]

"Furthermore, substances determined to be "toxic", persistent, bioaccumulative, anthropogenic, and which are not naturally occurring radionuclides or naturally occurring inorganic substances shall be proposed for implementation of virtual elimination under Section 65 (3) of CEPA 1999." [http://www.ec.gc.ca/CEPARRegistry/subs\\_list/ToxicList.cfm](http://www.ec.gc.ca/CEPARRegistry/subs_list/ToxicList.cfm)

The Canadian Environmental Protection Agency (CEPA) defines "**Toxic**" as:

"A substance is toxic if it is entering or may enter the environment in a quantity or concentration or under conditions that:

- a. have or may have an immediate or long-term harmful effect on the environment or its biological diversity;
- b. constitute or may constitute a danger to the environment on which life depends; or
- c. constitute or may constitute a danger in Canada to human life or health." (Section 64).

“Fluoride is a persistent bioaccumulator, and is entering into human food-and-beverage chains in increasing amounts.” NRC 1977 Environmental Fluoride

“Fluorine cannot be destroyed in the environment; it can only change its form” ATSDR Public Health Statement: Fluoride p2.

Boiling water gets rid of chlorine and concentrates fluoride. Grimaldo M, Borja-Aburto VH, Ramirez AL, Ponce M, Rosas M, Diaz-Barriga F. 1995 Endemic fluorosis in San Luis Potosi, Mexico. I. Identification of risk factors associated with human exposure to fluoride. Environmental Research 68(1):25-30.

Boiling of the drinking water (1 ppm F) in an aluminum pot increased the water Al content from 0.03 ppm to 0.20 ppm, and a concomitant increase of complexed F from non-detectable to 50% Brudevold F, Moreno E, Bakhos Y (1972). Fluoride complexes in drinking water. Archives of Oral Biology 17:1155-1163.

“While chlorine is evaporated in the process of boiling water, this does not happen with fluoride, and the concentration can become dangerously high in long periods of cooking.”

McLellan H. Fluoridation. Consumer Health Group

<http://www.consumerhealth.org/articles/display.cfm?ID=19990817225011>

<http://www.consumerhealth.org/aboutus/index.html>

## **Water Fluoridation Contaminants**

It has been suggested that the addition of contaminants like arsenic is insignificant, and it is not easily measured once diluted in drinking water. But, arsenic levels and dilution factors are known - BEFORE it is diluted into drinking water.

Arsenic is classified as a **Level 1 Carcinogen**, meaning that it is known to cause cancer in humans. There are no known “safe” concentrations of Level 1 Carcinogens.

Studies have linked arsenic ingestion to a number of health effects. These health effects include cancer of the skin, bladder, lung, kidney, nasal passages, liver and prostate, and problems associated with cardiovascular, pulmonary, immunological, neurological and endocrine systems. EPA <http://www.epa.gov/safewater/arsenic/index.html>

“The concentration of arsenic in drinking water representing an “essentially negligible” risk is 0.3 µg/L or 0.3ppb. Levels of arsenic in drinking water should be as close as possible to this level.” Health Canada May 2006 Guidelines for Canadian Drinking Water Quality: Guideline Technical Document. Prepared by the Federal-Provincial-Territorial Committee on Drinking Water of the Federal-Provincial-Territorial Committee on Health and the Environment.

U.S. EPA’s Maximum Contaminant Level Goal of arsenic (MCLG) = 0

California’s Public Health Goal for arsenic = 4ppt ( parts per trillion)

**Health Canada has no equivalent MCLG.**

MCLGs are to be “set at a level which assures that the health of persons will be protected against known or anticipated adverse effects [of the substance], allowing an adequate margin

of safety.” Loflin JJ, Chorover NJ, Grimmer J. Amicus brief for NFFE Local 2050, NRDC and S. Carolina vs USEPA, U.S. Dist. Court of Appeals, Civ. No. 85-1839 & 1854; 1986 Sep 3.

The U.S. National Sanitation Foundation (NSF) collected 100,000 water samples between 1980 to 1998 from more than 24,000 public water systems in 25 states (all sampled states diluted fluoride additives in their water to 1 ppm). Health Canada recommended guidelines for fluoride are 0.8-1.0ppm. <http://www.hc-sc.gc.ca/waterquality>

The data was compiled by the U.S. Environmental Protection Agency (EPA). The Natural Resources Defense Council (NRDC) obtained the data under the Freedom of Information Act and conducted an analysis.

American National Standards Institute/National Sanitation Foundation (ANSI/NSF) have created a Standard 60 for chemical additives which is used by most provinces and territories in Canada. NSF Standard 60 defines the amount of contaminant permissible in drinking water via their **Single Product Allowable Contaminants (SPAC)** whereby any one product can only contribute up to 10 percent of the Maximum Allowable Contaminant level (MAC). This is a **safety factor** added because other direct additives might also contribute that same contaminant in drinking water.

The following analysis demonstrates that some samples exceed the NSF SPAC:

- **Average Contaminant Concentration** in Samples with Positive Results **0.49 ppb**
- **Maximum Contaminant Concentration** in Samples with Contaminants **1.66 ppb**
- ANSI/Standard 60 SPAC = 10% of MAC [10ppm] 1.0 ppb
- US EPA and Health Canada MCL/MAC 10 ppb

From Table 1 in a Letter by Stan Hazan, General Manager of the Drinking Water Additives Certification Program, NSF, to the Honorable Ken Calvert, Chairman of the Subcommittee on Energy and the Environment, Committee on Science, U. S. House of Representatives , July 7, 2000.

The Maximum Allowable Contaminant level (MAC) is the point above which governments are required to remediate water contaminants. These standards do not represent a “safe” level for a lifetime of ingestion. The Maximum Contaminant Level Goals represent “safe” levels.

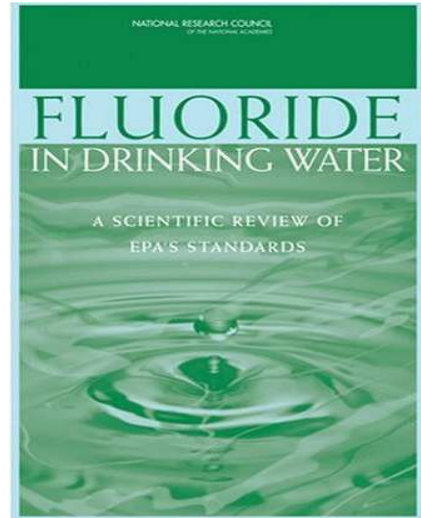
The NSF has inexplicably ignored their own SPAC [10% of MAC] requirement for fluoride. SPAC for fluoride is 1.2mg/L – not 0.15mg/L which is 10% of Health Canada’s MAC of 1.5mg/L or 0.4mg/L which is 10% of US MCL of 4ppm].

An NRC report on Arsenic prompted the lowering of the U.S./Canadian Maximum Contaminant Levels for arsenic to 10 ppb. It calculates that 1 person in 3000 will risk lung/bladder cancer because of the addition of hydrofluorosilicic acid. Reporting these risks as non-detected or representing them as non-significant is a misrepresentation of material fact. <http://www.nap.edu/openbook.php?isbn=0309076293>

## 5. Evidence of Human Health Problems

### ***The U.S. National Research Council 2006 Report***

The most important document to date is the U.S. National Research Council's 2006 Report on Fluoride in Drinking Water. The National Research Council provides science, technology and health policy advice. The report details nearly 1,000 studies which describe individuals and groups potentially harmed from fluorides in drinking water at doses currently recommended in Canada.



The report found that people most “at risk” for adverse effects from water fluoridation chemicals are young children, diabetes patients, kidney disease patients, the elderly, hypersensitive individuals, pregnant or lactating mothers, and individuals deficient in nutrients like calcium, magnesium, iodine and selenium.

Report available online at  
<http://www.nap.edu/catalog/11571.html>

### ***The National Research Council of Canada 1977 Environmental Fluoride Report***

“Large quantities of fluoride are also discharged into streams, rivers, lakes and oceans, as a component of industrial waste-waters. It appears probable that the amounts thus discharged are several-fold larger than the amounts discharged into the atmosphere. Many systems utilized for airborne emission-control contribute extensively to the amount of fluoride discharged in wastewaters.”

“Fluoride is a persistent bioaccumulator, and is entering into human food-and-beverage chains in increasing amounts.”

“Long-term ingestion, with accumulation of fluoride in animals and man, induces metabolic and biochemical changes, the significance of which has not yet been fully assessed.”

“Fluoride has displayed mutagenic activity in studies of vegetation, insects, and mammalian oocytes.”

“In Section 5.1.1, we stated that the current total fluoride intake from foods and beverages, in areas with fluoridated (1 ppm) water, probably ranges from 3.5 to 5.5 mg/day.”

“There is no doubt that inadequate nutrition increases the severity of fluoride toxicosis.”

## Ontario Ministry of Health and Long Term Care 1999 Report

“Current studies support the view that dental fluorosis has increased in both fluoridated and non-fluoridated communities. North American studies suggest rates of 20 to 75% in the former and 12 to 45% in the latter.”

“In Canada, actual intakes are larger than recommended intakes for formula-fed infants and those living in fluoridated communities. Efforts are required to reduce intakes among the most vulnerable age group, children aged 7 months to 4 years.” Report available online at [http://www.health.gov.on.ca/english/public/pug/ministry\\_reports/fluoridation/fluoridation.html](http://www.health.gov.on.ca/english/public/pug/ministry_reports/fluoridation/fluoridation.html)

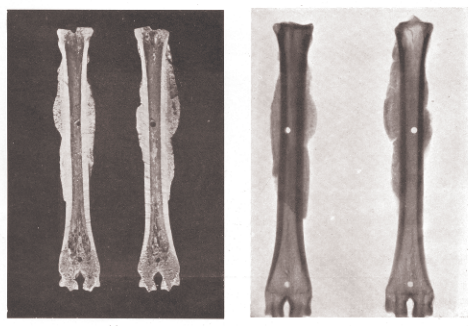
## U.S. Department of Health and Human Services 1993 Report

“Existing data indicate that subsets of the population may be unusually susceptible to the toxic effects of fluoride and its compounds. These populations include the elderly, people with deficiencies of calcium, magnesium, and/or vitamin C, and people with cardiovascular and kidney problems.”



“Because fluoride is excreted through the kidney, people with renal insufficiency would have impaired renal clearance of fluoride (Juncos and Donadio 1972).”

“People on kidney dialysis are particularly susceptible to the use of fluoridated water in the dialysis machine (Anderson et al. 1980).”



“Impaired renal clearance of fluoride has also been found in people with diabetes mellitus and cardiac insufficiency (Hanhijarvi 1974). People over the age of 50 often have decreased renal fluoride clearance (Hanhijarvi 1974). This may be because of the decreased rate of accumulation of fluoride in bones or decreased renal function. This decreased clearance of fluoride may indicate that elderly people are more susceptible to fluoride toxicity.”

**Photos:** Bones of Icelandic Sheep that died due to fluoride over-exposure. Roholm, K. 1937. Fluoride Intoxication: A Clinical Hygienic Study With a Review of Literature and Some Experimental Investigations. H.K. Lewis and Co.,

“Recent studies indicate that fluoride may increase the rate of hip fractures in elderly men and women.”

“A large study of fluoride conducted by the National Toxicology Program with both rats and mice found that a small number of male rats developed bone cancer (osteosarcoma) after drinking water with high levels of fluoride in it throughout their lives...The bone cancer seen in the rat study is rare in humans, although its frequency has recently increased among males in countries with fluoridated water...The osteosarcoma rate in males living in fluoridated areas has increased markedly in recent years...” Report available on the Agency for Toxic Substances and Disease Registry website <http://www.atsdr.cdc.gov/>.

## Bone Health

It has been argued that skeletal fluorosis does not exist in North America. Evidence, however, is to the contrary.

Dr. William Ashe, a scientist from the Kettering Institute reported large incidences of skeletal fluorosis in workers in an aluminum plant in Massena, New York.

“The most outstanding characteristic of this group is the occurrence of 91 cases of fluorosis of the bone. X-rays showed up to 100% of bones involved – serious tooth decay, gum disease, heart problems, lung fibrosis were evident. “one sees hypertrophic changes in bone... similar to changes seen in experimental animals with bone fluorosis. The interosseous membranes are often ossified...” Bryson, C. *The Fluoride Deception*. Seven Stories Press; New Ed (March 1, 2006) p 258-259

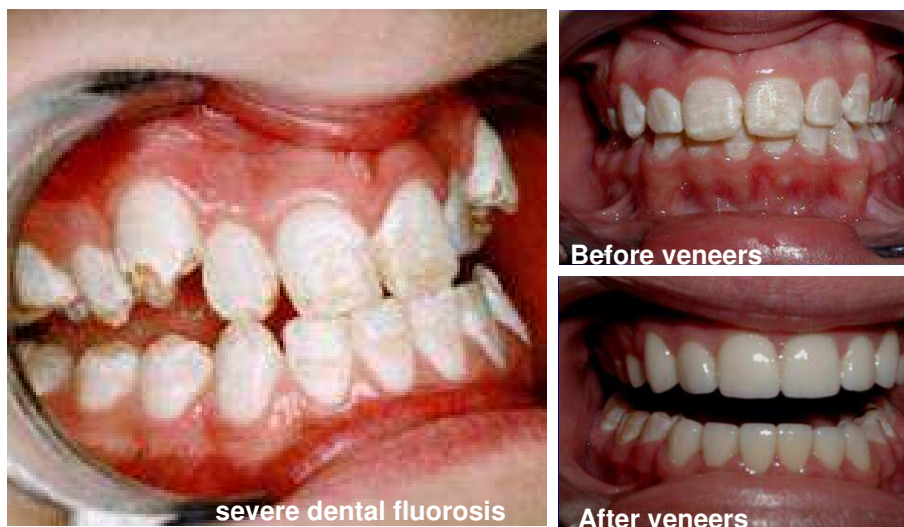


Photo: Forearm X-ray of patient showing increase in bone density and calcification of the interosseous membrane due to over-exposure of fluoride. *Journal of the International Society for Fluoride Research*: <http://www.fluorideresearch.org/forearm/files/forearm.pdf>

## Dental Health

Over-exposure to fluoride causes dental fluorosis. According to the Ontario Ministry of Health and Long Term Care 1999 Report (see pages 14-15), incidence of dental fluorosis is nearly twice as prevalent in communities with fluoridated water, compared to communities that do not fluoridate their water.

“In moderate to severe forms of fluorosis, porosity increases and lesions extend toward the inner enamel. After the tooth erupts, its porous areas may flake off, leaving enamel defects where debris and bacteria can be trapped. The opaque areas can become stained yellow to brown, with more severe structural damage possible, primarily in the form of pitting of the tooth surface.” NRC 2006, p 79



Photos: Dr.Hardy Limeback  
<http://fluoridealert.org/health/teeth/fluorosis/moderate-severe.html>

Dental fluorosis is expensive to treat: porcelain veneers cost \$600 – \$800 per tooth, and have a life expectancy of 10-15 years.

Fluoridation of water "has contributed to the birth of a multi-billion dollar industry of tooth bleaching and cosmetic dentistry. More money is being spent now on the treatment of dental fluorosis than what would be spent on dental decay if water fluoridation were halted." Dr. Hardy Limeback, the Head of Preventive Dentistry at the University of Toronto Oct 22, 1999 in International Fluoride Information Network Bulletin # 3. Available from [ggvideo@northnet.org](mailto:ggvideo@northnet.org)

According to the Ontario Ministry of Health and Long Term Care 1999 Report, 25-70% of Canadians in fluoridated communities have dental fluorosis. Assuming that 40% of Canadians have dental fluorosis, that means that 13.2 million Canadians have dental fluorosis.

Some individuals have suggested that the dental fluorosis is a "questionable" health concern. For those who have dental fluorosis, there is nothing "questionable" about the social embarrassment caused by teeth with white or brown specks or the associated costs to repair.

Using concentrations of fluoride as low as 0.1ppm, "regardless of its amount, fluoride intake has harmful effects on both tooth and bone formation." Kakei M, Sakaeb T, Yoshikawac M, Tamurad N. 2007 Effect of fluoride ions on apatite crystal formation in rat hard tissues. *Annals of Anatomy* 189: 175—181.

## ***Thyroid Health***

The US National Research Council 2006 Report discusses how endocrine systems and thyroid functions are impaired at exposure levels to fluoride below the consumption levels expected from drinking "optimally fluoridated water"; "several lines of information indicate an effect of fluoride exposure on thyroid function."

According to the NRC 2006 Report on Fluorides in Drinking Water, ingesting as little as 0.7mg/day of fluoride by a 75kg individual, when iodine insufficient, may cause thyroid suppression [P 263, Table 8-2]

According to many sources, [see ATSDR 1993, NRC Canada 1977] we consume about 3mg/day, of fluoride, on average. According to the Centers for Disease Control, the average urinary iodine level today is half what it was in 1971. The agency estimates that 36% of U.S. women now have sub-optimal iodine intake. <http://www.cdc.gov/nchs/products/pubs/pubd/hestats/iodine.htm>

"In summary, evidence of several types indicates that fluoride affects normal endocrine function or response; the effects of the fluoride-induced changes vary in degree and kind in different individuals. Fluoride is therefore an endocrine disruptor." NRC 2006 Report on Fluorides in Drinking Water

## ***Kidney Health***

Concern regarding the ability of damaged or undeveloped kidneys to filter toxic substances such as hydrofluorosilicic acid has been raised<sup>121-125</sup>. Also of concern is the burden of

chronic, low doses of toxic substances, over a life-time, on the function of organs such as the kidney.

The US National Kidney Foundation's alleged failure to warn kidney patients that they are particularly susceptible to harm from ingested fluoride from drinking water and other sources is discussed in a precedent-setting letter to the Foundation from a legal firm <http://fluoridealert.org/press/nkf.htm>.

"According to the National Institute of Dental Research, also part of NIH, fluoride levels in water are set according to normal consumption of water. If an individual is consuming abnormally large quantities of water, drink bottled water." National Institute of Diabetes and Digestive and Kidney Diseases, Dept. of Health & Human Services. Harm to Thyroid, 1991.

## **Brain Health**

A recent Lancet review referred to fluoride as an "emerging neurotoxic substance" due to evidence linking fluoride to lower IQs in children, and brain damage in animals<sup>121</sup>.

"Fluorides also increase the production of free radicals in the brain through several different biological pathways. These changes have a bearing on the possibility that fluorides act to increase the risk of developing Alzheimer's disease." NRC 2006

"animals administered the lowest dose of AIF- [Aluminum bound to fluoride] 0.5 ppm exhibited a greater susceptibility to illness and higher mortality than animals administered higher levels [5 ppm, 50 ppm]." Varner JA, et al. (1998).

Chronic administration of aluminum-fluoride and sodium-fluoride to rats in drinking water: alterations in neuronal and cerebrovascular integrity. *Brain Research* 784: 284-298.

"The possible association of cytogenetic effects with fluoride exposure suggests that Down's syndrome is a biologically plausible outcome of exposure." NRC 2006 p170

A 1995 study conducted by a leading neurotoxicologist, Phyllis Mullenix, Ph.D., and published in the journal *Neurotoxicology and Teratology* showed that baby rats — depending on when they were exposed to fluoride dosages similar to what human children receive — exhibited hyper- and hypo-activity: when the animals were exposed to fluoride before birth they exhibited behavior characterized as hyperactive; when they were dosed after birth they became hypoactive ("couch potatoes"). Mullenix PJ, Denbesten PK, Schunior A, Kernan WJ. 1995 Central Nervous System Damage from Fluorides. *Neurotoxicology and Teratology*. 17(2): 169-177.

## **Hypersensitivity**

Many drugs and foods are known to cause hyper-sensitive reactions in some individuals, e.g. Penicillin and Peanuts.



According to research, 1-4% of human population is hyper-sensitive to fluoride<sup>30,31</sup>. Some animals are also known to be hypersensitive to fluoride<sup>117-119</sup>.

Toronto resident, Aliss Terpstra, born 1952 in Grand Rapids, Michigan, is hypersensitive to fluoride. She was born in the first city in the U.S. to add fluoride to the water (1945), and has lived in cities with fluoridated water her entire life. Her youngest child is also hypersensitive to fluoride and has moderate dental fluorosis.



Aliss' symptoms after ingesting fluoride include extreme thirst, urgent, frequent and dilute urine similar to diabetes insipidus, heart palpitations, fatigue, abdominal pain, bloating, diarrhea, lowered body temperature, head-aches, muscle weakness, and joint pain.

"In hypersensitive individuals, fluorides occasionally cause skin eruptions such as atopic dermatitis, eczema or urticaria. Gastric distress, headache and weakness have also been reported. These hypersensitivity reactions usually disappear promptly after discontinuation of the fluoride." *Physician's Desk Reference, 1994, 48th Edition, p. 2335-2336.*

## **Cancer**

Evidence to date suggests an age-specific, sex-specific (young males, under the age of 20) risk associated with fluoride. A recent peer-reviewed case-controlled study from Harvard University found a 5-7 fold increase in osteosarcoma (a frequently fatal bone cancer) in young men if they live in a fluoridated community<sup>32</sup>. (see Bassin 2006 study attached)

Using data from the Surveillance, Epidemiology and End Results (SEER)<sup>33</sup>, Hoover et al. found an unexplained increase in osteosarcoma in males less than 20 years of age in fluoridated versus non-fluoridated areas. The National Toxicology Program animal study, found a positive association for male rats, but no association for female rats or mice<sup>34</sup>. A smaller study examining osteosarcoma in New Jersey also showed an increase in incidence rates for males less than 20 years old who lived in fluoridated areas compared to those living in non-fluoridated areas<sup>35</sup>.

It is biologically plausible that fluoride affects the incidence rate of bone cancer, and that this effect would be strongest during periods of growth, particularly in males because;

1. First, approximately 99% of fluoride in the human body is contained in the skeleton with about 50% of the daily ingested fluoride being deposited directly into calcified tissue (bone or dentition)<sup>36</sup>.
2. Second, fluoride acts as a mitogen, increasing the proliferation of osteoblasts<sup>37,38</sup> and its uptake in bone increases during periods of rapid skeletal growth<sup>36</sup>.

3. Third, the amount of fluoride present in bone depends on gender and intake<sup>39</sup> and intake, on average, is greater for males than females for all ages over 1 year<sup>40</sup>.

"I was the counsel for the plaintiffs in rigorous trials in Pennsylvania, Illinois, and Texas, resulting in judicial findings in all three cases - based on the quality of the evidence heard on both sides - that artificial fluoridation of public water supplies induces large-scale cancer and other ailments in man. Eminent experts from great universities, government institutions, and the private sector appeared in all three cases, and were all subjected to direct and cross examination by veteran trial lawyers before experienced trial judges. The professional union at the national headquarters of the United States Environmental Protection Agency later reviewed these judicial findings, and certified them as scientifically correct to a subcommittee of the United States Senate. Since those hearings, the evidence reported in leading scientific and medical journals has extensively confirmed and elaborated what the three judges found. Under these circumstances, it is morally irresponsible to continue this practice, and governments have an urgent duty to end it." John Remington Graham, BA, LLB, co-author of "La fluoration autopsie d'une erreur scientifique," 2005, St-Agapit, Quebec

### ***Who is most susceptible to fluoride?***

The current population of Canada is estimated at 33 million. Approximately 43% of Canadians ingest hydrofluorosilicic acid through artificially-fluoridated water<sup>41</sup> and many others ingest natural-occurring fluoride in water in excess of 0.5mg/L.

Following is a list of groups of people most susceptible to fluoridated water:

- Young children and fetuses
- Individuals who drink >2 litres of water per day (athletes, soldiers, laborers, lactating mothers, diabetes patients)
- Individuals who are unable to filter water in their body (individuals with kidney damage, young children)
- Individuals with cardiovascular disease
- The elderly

**1-4% of Canadians** may be hypersensitive to fluoride [330,000 – 1, 320,000 Canadians]

**5% of Canadians** have diabetes [1,650,000 Canadians]

**5% of Canadians** have kidney disease [1,650,000 Canadians]

**27- 44% of Canadians** have diets low in calcium, magnesium, iodine (which helps to counteract fluoride toxicity) [8,910,000 – 14,520,000 Canadians]

**5%- 40% of Canadians** have thyroid dysfunction [1,650,000 – 13,200,000 Canadians]

Reproduced from Table 1 in a letter from J Charles Fox, Assistant Administrator, Environmental Protection Agency, to Congressman Kenneth Calvert, Chairman Subcommittee on Energy and the Environment, Committee on Science, House of Representatives, USA, September 5, 2000.

"...increasing numbers of people with carpal-tunnel syndrome, arthritic-like pains, osteoporosis may be due to the mass fluoridation of drinking water." EPA 2003 Annual Report

"Whereas dental fluorosis is easily recognized...the skeletal involvement is not clinically obvious until the advanced stage of crippling fluorosis ... early cases may be misdiagnosed as rheumatoid-or osteo-arthritis." WHO website 1970.

## Infants and Children



Photo: [www.fluoridealert.org](http://www.fluoridealert.org)

The American Dental Association, the US Centers for Disease Control and the Ontario Ministry of Health and Long Term Care 1999 Report express concern regarding the increased risk of dental fluorosis with children with increasing exposures to fluoride from all sources, of which fluoridated water is the primary source<sup>42</sup>. The US NRC 2006 Report on Fluoride in Drinking Water Report, and other studies<sup>43-98</sup> raise concern about the risk of increasing exposures to the baby's developing brain and other delicate tissues like the kidney which cannot adequately filter fluoride [infants can only filter 15% fluoride<sup>42</sup>. Healthy adults are able to filter/excrete about 50% of ingested fluoride.

The American Dental Association had a policy change, in November 2006, advising parents of children under 1 year to use only the following types of water when preparing infant formula; "purified, distilled, deionized, demineralized, or produced through reverse osmosis."

A letter from the Ontario Ministry of Health & Long Term Care 2000 also advises Medical Officers of Health to inform the public of the dangers of over-exposures of fluoride from all sources: "Where baby formula is used, non-fluoridated water should be used for mixing."<sup>43</sup>

"The safety of the use of fluorides ultimately rests on the assumption that the developing enamel organ is most sensitive to the toxic effects of fluoride. The results from this study suggest that the pinealocytes [cells in pineal gland] may be as susceptible to fluoride as the developing enamel organ." Luke J. (1997). The Effect of Fluoride on the Physiology of the Pineal Gland. Ph.D. Thesis. University of Surrey, Guildford. p. 176.

The US Public Health Service recommends fluoridating water from 0.7 – 1.2ppm.  
Health Canada recommends fluoridating water from 0.8 – 1.0ppm.

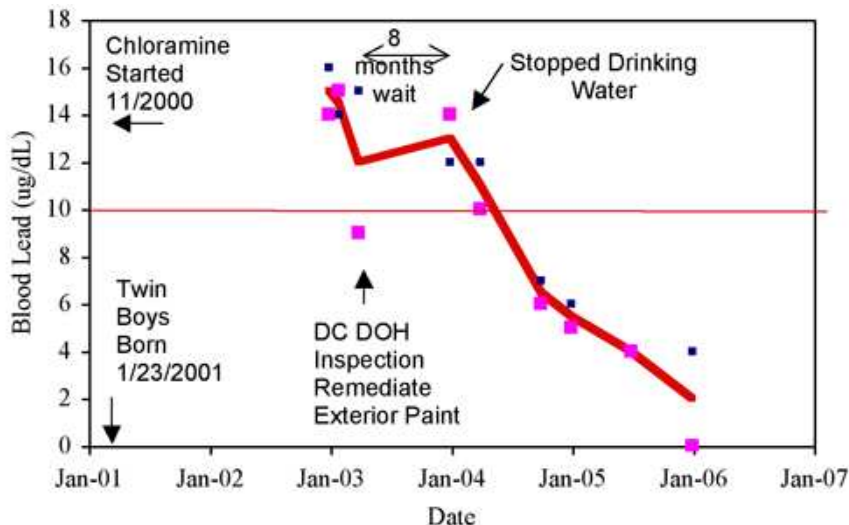
Infants are overexposed to fluoride in most major cities. The U.S. Environmental Working Group compiled data on infant exposure across large cities in the U.S. (see <http://www.ewg.org/node/21000>)

Given the similar levels of fluoridation between Canada and the U.S., the data on infant overexposure in the U.S. cities is representative of overexposure in Canada:

<b>City</b>	<b>Average Fluoride Levels 1998-2002</b>	<b>% of Babies Over Safe Exposure Level</b>	<b>% of Formula-Fed Babies Over Safe Exposure Level</b>
Boston, MA	1.30ppm	36.2	61.2
Detroit, MI	1.13ppm	33.4	54.2
Minneapolis, MN	1.03ppm	28.7	47.3
Seattle, WA	1.00ppm	27.1	44.6
San Francisco, CA	1.00ppm	27.1	44.6
Philadelphia, PA	1.00ppm	27.1	44.6
New York City, NY	1.00ppm	27.1	44.6
Memphis, TN	1.00ppm	27.1	44.6
Atlanta, GA	1.00ppm	27.1	44.6
Louisville, KY	0.96ppm	26.2	44.2
Columbus, OH	0.95ppm	26	43.1
Indianapolis IN	0.92ppm	23.8	40.4
Baltimore, MD	0.91ppm	23.8	39.8
Chicago, IL	0.88ppm	23	40.2
Tampa, FL	0.85ppm	20.9	36.2
Austin, TX	0.81ppm	18.2	32.7
Washington, DC	0.80ppm	17.8	32.1
San Antonio, TX	0.80ppm	17.8	32.1
Phoenix, AZ	0.75ppm	14.5	26.7
Dallas, TX	0.68ppm	10.6	19.6
Miami, FL	0.66ppm	10.1	19.2
Los Angeles, CA	0.61ppm	8.5	15.5
Jacksonville, FL	0.61ppm	8.5	15.5
Houston, TX	0.31ppm	0.6	1.2
San Diego, CA	0.30ppm	0.6	1.0
San Jose, CA	0.13ppm	0.03	0.1

## A growing body of research suggests that the practice of fluoridation may double the exposure of lead in our children.

A statistically significant association between the use of silicofluorides as water fluoridation agents (in both Massachusetts and New York State) and an increased uptake of lead into children's blood<sup>44-45</sup> was previously demonstrated.



### Blood lead data for twin boys born in 2000.

“After the levels were found to be higher than CDC's [Centers for Disease Control] level of concern, DOH [department of health] inspected their home for lead paint and found only a remote exterior door as an admittedly unlikely source. However, painting the door failed to bring down the boys' blood lead levels. But when

they stopped drinking tap water and it was no longer used in cooking their meals, the boys' blood lead levels declined rapidly.” Renner R. 2006 Mis-Lead. Environmental Science Technology Online News: Science News May 31. [http://pubs.acs.org/subscribe/journals/esthag-w/2006/may/science/rr\\_mislead.html](http://pubs.acs.org/subscribe/journals/esthag-w/2006/may/science/rr_mislead.html).

### Sodium Fluoride → Silicofluorides

Silicofluorides were substituted for sodium fluoride in 1947 and endorsed in 1950 by the US Public Health Service without prior animal testing because rats teeth got as much fluoride as from sodium fluoride, and a community could save 4 cents per year per resident (McClure, 1950).<sup>46</sup>

### Chlorine → Chloramine

A switch from chlorine to chloramine [ammonia + chlorine] was recently recommended and adopted in some water systems for several reasons [Maas 2007] :

- Chloramine is cheaper than other disinfection methods
- Easy to add ammonium to already-chlorinated water
- Chloramine produced fewer disinfection by-products [DBPs] than chlorine

### Fluorosilicates + Chloramine + Leaded Brass = Increased Blood Levels

Two new studies<sup>46-47</sup> demonstrate that fluoride in various combinations with chlorinating chemicals (e.g. chlorine or chloramine) increases the release of lead from leaded brass fittings used in water pipes. There are several chemical reasons<sup>46</sup>:

1. fluosilicic acid, the most widely used fluoridating agent, is a good solvent for lead.
2. chlorine, ammonia, and chloramine are all hostile to copper in that they induce copper stress cracking and/or can dissolve it.
3. ammonia added to chlorine to produce chloramine will also react with fluosilicic acid to produce ammonium fluosilicate, an established solvent for copper alloys.

Besides these chemical factors, the lead in brass is present as nodules, so that any attack on the copper matrix of brass would make lead particles readily accessible for mobilization<sup>46</sup>.



**Chloramine destroys the normally protective lead dioxide (PbO<sub>2</sub>) scale inside lead pipes.** Renner R. Leading to lead. 2004 Scientific American 291(1):22–4.

“The change in disinfectant did cause mineral scales inside [Washington] D.C. lead service lines to dissolve, says corrosion expert Michael Schock with EPA’s Office of Research and Development.” Renner 2006

Pieces of solder from the water pipes can detach sporadically and contaminate the water. This is difficult to monitor because multiple samples can be collected from a tap with relatively low lead, but occasionally a sample can be collected that contains more than 15,000 ppb—as much lead as could be consumed in paint chips.

Photo: [http://pubs.acs.org/subscribe/journals/esthag-w/2006/may/science/rr\\_mislead.html](http://pubs.acs.org/subscribe/journals/esthag-w/2006/may/science/rr_mislead.html).

**Increased blood levels were found in homes without lead service lines or lead soldered copper piping. The only possible lead source had to be leaded-brass plumbing and/or brass faucets.**

Silicofluoride use is associated with 2 neurotoxic effects<sup>47</sup>:

1. Prevalence of children with elevated blood lead (PbB>10µg/dL) is about double that in non-fluoridated communities
2. Voluntary and involuntary muscle action is stimulated by **acetylcholine** (Ach) which is cleaved by the enzyme **acetylcholinesterase** (AChE) to end the stimulation. Without AChE, muscle excitation would persist as spasm with potentially lethal effect, as caused by a nerve gas. ACh modulated by AChE also induces saliva flow. Intense salivation is a symptom of fluoride poisoning. Silicofluorides inhibit AChE.

“It is proposed here that SiFW [silicofluorides in water] induces protein mis-folding via a mechanism that would affect polypeptides in general, and explain dental fluorosis, a tooth enamel defect that is not merely "cosmetic" but a "canary in the mine" foretelling other adverse, albeit subtle, health and behavioral effects.”<sup>47</sup>.

# Evidence of Environmental Harm

## *Fluoride in Ecosystems*

“What happens to inorganic fluorides released into the environment? Once in water, inorganic fluorides can be taken up by aquatic plants. Fish and other aquatic animals can also take up inorganic fluoride from water and food and accumulate it in their bones or exoskeletons...Although inorganic fluorides may move around in the environment, and even change form depending on, for example, water chemistry, fluorine itself can not be degraded.” Environment Canada [http://www.ec.gc.ca/ceqg-rcqe/English/Html/GAAG\\_Fluoride.cfm](http://www.ec.gc.ca/ceqg-rcqe/English/Html/GAAG_Fluoride.cfm)

## *Destruction of marine and freshwater fish*

“Inorganic fluorides affect basic physiological and biochemical processes of fish, plants and other aquatic organisms. By doing so, inorganic fluorides can slow growth and development, cause abnormal behaviour and lead to death. The degree to which these effects occur depends in part on the concentration and form of inorganic fluoride, period of exposure, water chemistry, and species and age of aquatic species. Some species that seem particularly sensitive include rainbow trout, fingernail clams, water fleas, and certain green algae.”

“The Canadian Water Quality Guideline (CWQG) to protect freshwater life is 0.12 milligrams of inorganic fluoride per litre of water.” Environment Canada [http://www.ec.gc.ca/ceqg-rcqe/English/Html/GAAG\\_Fluoride.cfm](http://www.ec.gc.ca/ceqg-rcqe/English/Html/GAAG_Fluoride.cfm)

Background concentrations of fluoride from fertilizers and pesticides are assumed to be between 0.1mg/L and 0.2mg/L. At 0.2 mg/L, fluoride is already at a “critical level” for some species of fish – e.g. trout, salmon and insects that fish feed upon.

“Levels of fluorides in surface water average about 0.2 parts of fluoride per million parts of water (ppm).” ATSDR Public Health Statement: Fluoride p3



Photo: [www.grandriver.ca/policyplanningregulations/erosion\\_dfo.pdf](http://www.grandriver.ca/policyplanningregulations/erosion_dfo.pdf)

The City of Kamloops in British Columbia, when it was fluoridated to 1.0 mg/L measured secondary effluent levels discharged to the Thompson River to 1.5 mg/L. This study and others, prompted Kamloops to stop water fluoridation in 2005. Dr. Foulkes 2002 Response to WAC 197-11-960 Environmental Checklist for Tacoma-Pierce County Health Department Fluoridation.

“A review of literature and documentation suggests that concentrations of fluoride above 0.2 mg/L have lethal (LD50) effects

on and inhibit migration of "endangered" salmon species whose stocks are now in serious decline in the US Northwest and British Columbia." Foulkes RG, Anderson AC. 1994 Impact of Artificial Fluoridation on Salmon Species in the Northwest USA and British Columbia, Canada. Fluoride Journal 27:4 220-226.

On the Columbia River a study was conducted to determine the effects of water fluoridation on the migration of fish. The study was set up with two 'migration chutes' where the fish had a choice of which chute to enter. One chute had 0.5 mg/L of fluoride, and the other chute had no fluoride. Downstream of both chutes, water concentrations were at 0.25 mg/L (the result of both water streams mixing). Surprisingly, the research found that fish wouldn't go up the unfluoridated chute (as expected): they stopped at the water with 0.25 mg/L of fluoride. Therefore, fluoridated water is a barrier to fish migration. Daemker, DM, Dey, DB. Evidence for fluoride effects on salmon passage at John Day Dam, Columbia River 1982-1986, North American Journal of fisheries management, 1989, 9, 154-162

The mean concentration of fluoride in domestic sewage, which includes use of a fluoride product at 1.0 mg/L, is estimated to be: 2.3 mg/L in raw sewage; 1.15 mg/L in secondary effluent. Dr. Foulkes' 2002 Response to WAC 197-11-960 Environmental Checklist for Tacoma-Pierce County Health Department Fluoridation andersfoulkes@cs.com



Photo: [www.grandriver.ca/policyplanningregulations/erosion\\_dfo.pdf](http://www.grandriver.ca/policyplanningregulations/erosion_dfo.pdf)

Singer and Armstrong found secondary effluent levels in fluoridated (at 1.0 mg/L) Minneapolis-St. Paul of 1.21 mg/L and non-fluoridated Brainerd (0.13 mg/L in water) of 0.38mg/L. Singer L, Armstrong WD. 1977 Fluoride in Treated Sewage and in Rain and Snow. Archives of Environmental Health Jan/Feb P 21-23.

The mean value of domestic sewage including fluoride in the water supply at a mean concentration of 0.25 mg/L (range 0.1-0.4 mg/L) was reported as 1.55 mg/L fluoride in raw sewage and 0.63 mg/L fluoride in secondary effluent (range 0.3-1.5). Masuda TT. 1964. Persistence of Fluorides from Organic Origins in Waste Waters. Developments in Industrial Microbiology 5: 53-70.

"Studies show that elevated concentrations in fresh water receiving fluoridated effluent may persist for some distance. Bahls (19) showed that the effluent from Bozeman Montana of 0.6-2.0 mgF/L, discharged into the East Galletin River did not return to the background level of 0.33 mgF/L for 5.3 km. Singer and Armstrong (18) reported that a distance of 16 km was required to return the Mississippi River to its background level of 0.2 mg/FL after receiving the effluent of 1.21 mgF/L from Minneapolis-St Paul. Although dilution reduces *concentration* over distance, the *amount* of fluoride in effluent is either deposited in sediment locally or is carried to the estuary where it may persist for 1-2 million years (16) or may re-contaminate if dredging were to take place." Foulkes RG, Anderson AC. 1994 Impact of Artificial

Fluoridation on Salmon Species in the Northwest USA and British Columbia, Canada. Fluoride Journal 27:4 220-226.

Warrington in a study for the British Columbia Ministry of Environment also identified 0.2 mg/L fluoride as a “critical level” for fresh water species. Warrington, PD, Ambient Water Quality Criteria for Fluoride. Technical Appendix 1990, British Columbia Ministry of Environment

Government of Canada Environmental Protection Act - estimated adverse effect thresholds (lethal, growth impairment and egg production) are 0.28 mg/L fluoride for fresh water species and 0.5 mg/L fluoride for marine species. Government of Canada 1993, Inorganic Fluorides, Canadian Environmental Protection Act (Priority Substances List Assessment Report).

### ***Harm to animals (pets, livestock and wild animals)***

Hypersensitive reactions to artificially fluoridated water [0.35 to 1.3 ppm Fluoride] causes skin lesions. Dental Fluorosis and Gingivitis [inflammation of gums] in Horses. No other known source of fluoride in diets. Other reproducible symptoms include colitis, thyroid suppression.

Photos: citations 119, 11

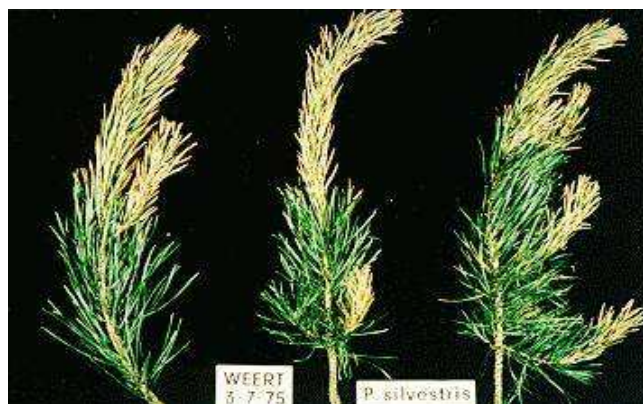


### ***Harm to plants and trees***

Fluoride damages trees including Scots Pine. New growth on branch tips is killed off in a phenomenon called tip burn.

“The fluoride concentrates in the margins and tip so it is these areas that generally are the first to show visible injury.”

<http://www.ncl.ac.uk/airweb/fluoride/Fluoride1.htm>



Photograph by Davison & Weinstein  
<http://www.ncl.ac.uk/airweb/fluoride/Fluoride1.htm>

## 6. Costs of Water Fluoridation

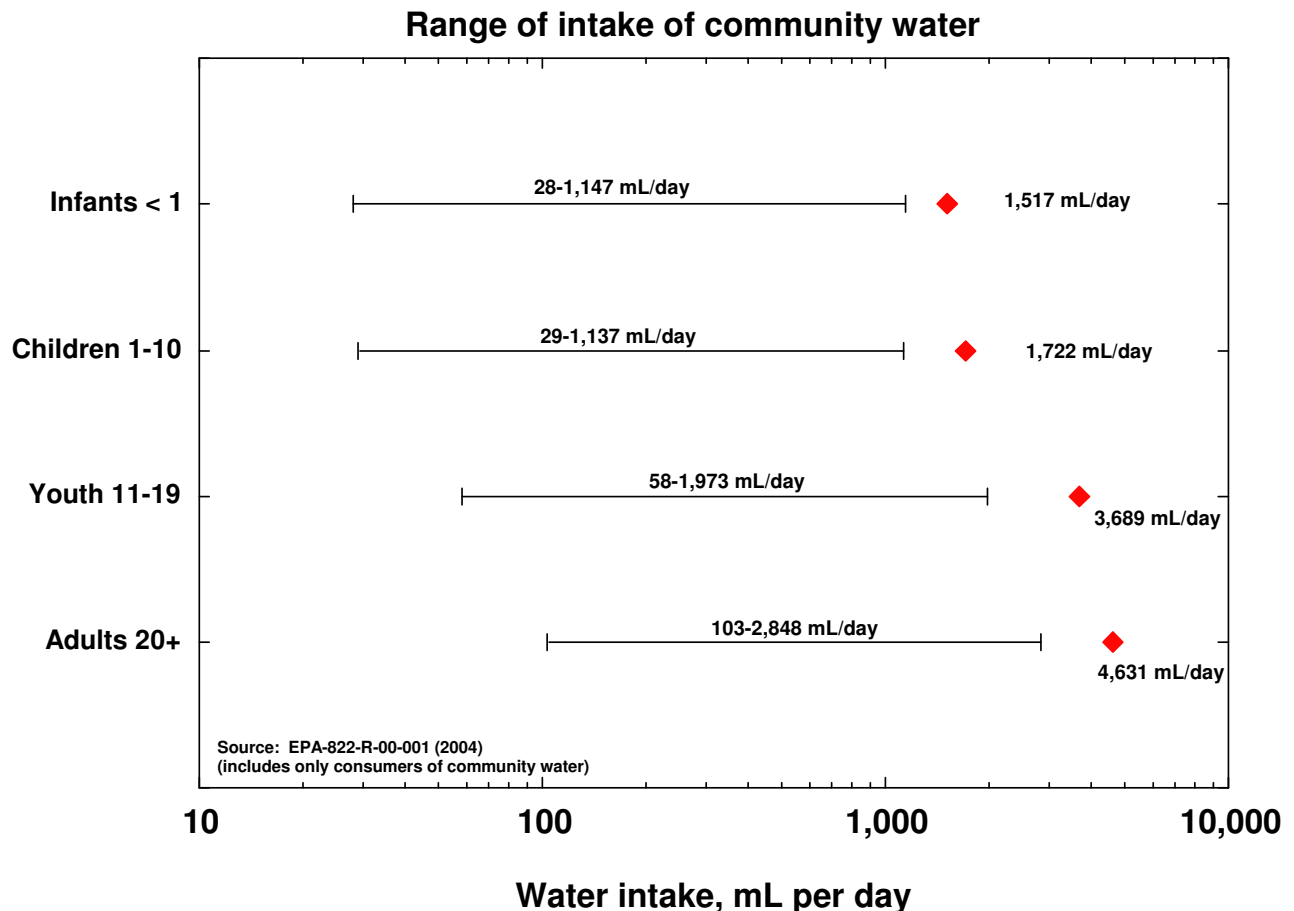
According to arguments made in this petition, water fluoridation is ineffective and causes harm to humans and the environment.

In addition to these drawbacks, fluoridation is very expensive. According to the Chief Dental Officer for Health Canada, annual maintenance costs of water fluoridation are “\$3 per capita per annum” [as stated in minutes]<sup>1</sup>:

<b>City</b>	<b>Population</b>	<b>Annual Fluoridation Costs</b>
<b>Toronto</b>	2.5 million x \$3/person/year	\$7.5 million/year
<b>Calgary</b>	1 million x \$3/person/year	\$3 million/year
<b>Hamilton</b>	500,000 x \$3/person/year	\$1.5 million/year

## 7. Presentation by Kathleen M. Thiessen on Fluoridation in California

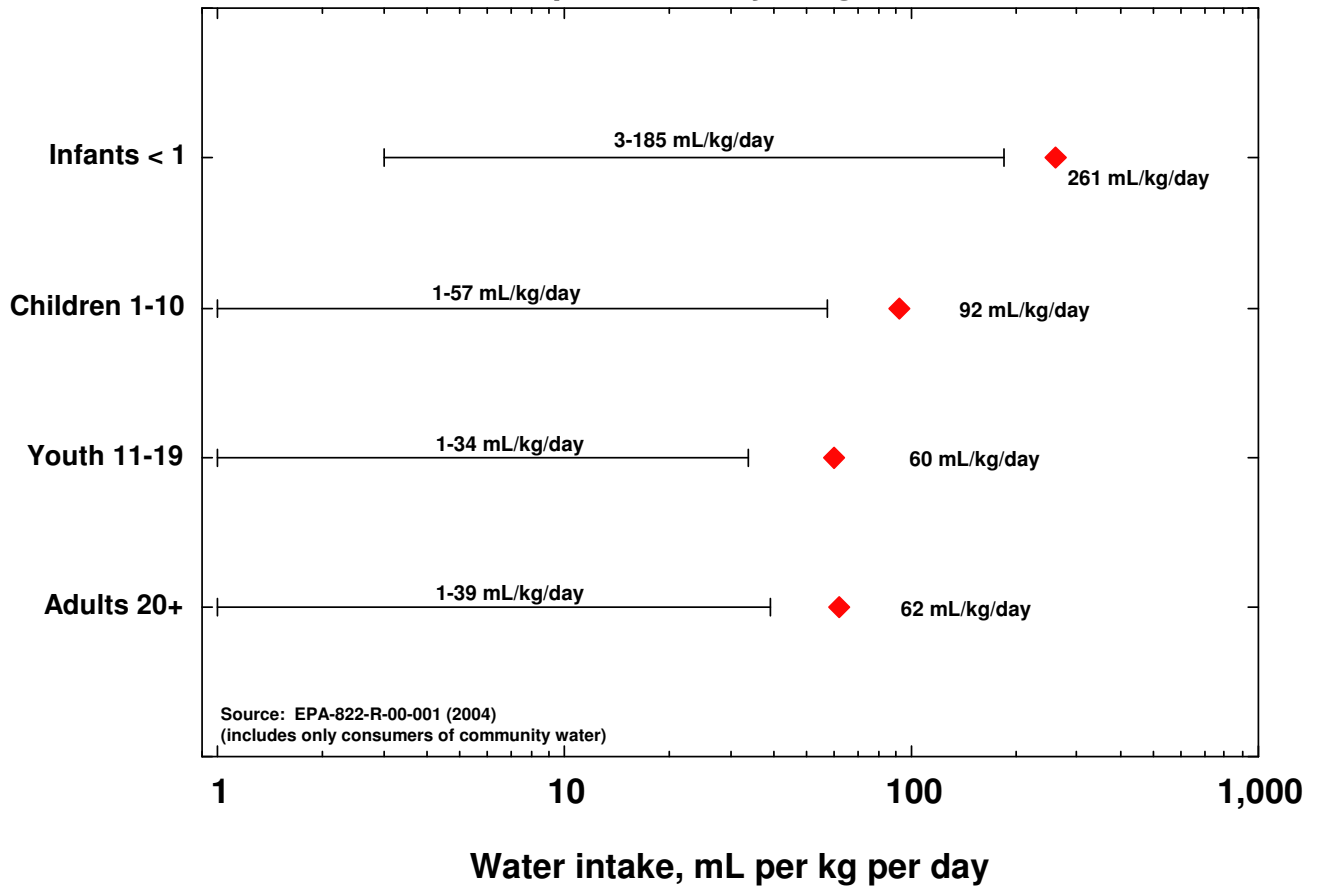
Kathleen M. Thiessen, Ph.D., a committee member of the U.S. National Research Council 2006 Report on Fluorides in Drinking Water, wrote the following report on the health effects of water fluoridation. Kathleen works with the Center for Risk Analysis at SENES Oak Ridge, Inc.



The first graph illustrates the expected range of consumption of community water (public tap water) for various age groups, in quantities of milliliters per day (mL per day). The ranges include only people who actually consume tap water. Note that some people consume substantially more tap water than the usual range (indicated by the diamonds). This information is from an EPA report published in 2004.

The total consumption of community water shown here is not to be confused with total fluid consumption or total water consumption. It does not include well water, bottled water, or commercial beverages. It does include water consumed directly and water used to prepare household or restaurant foods and beverages

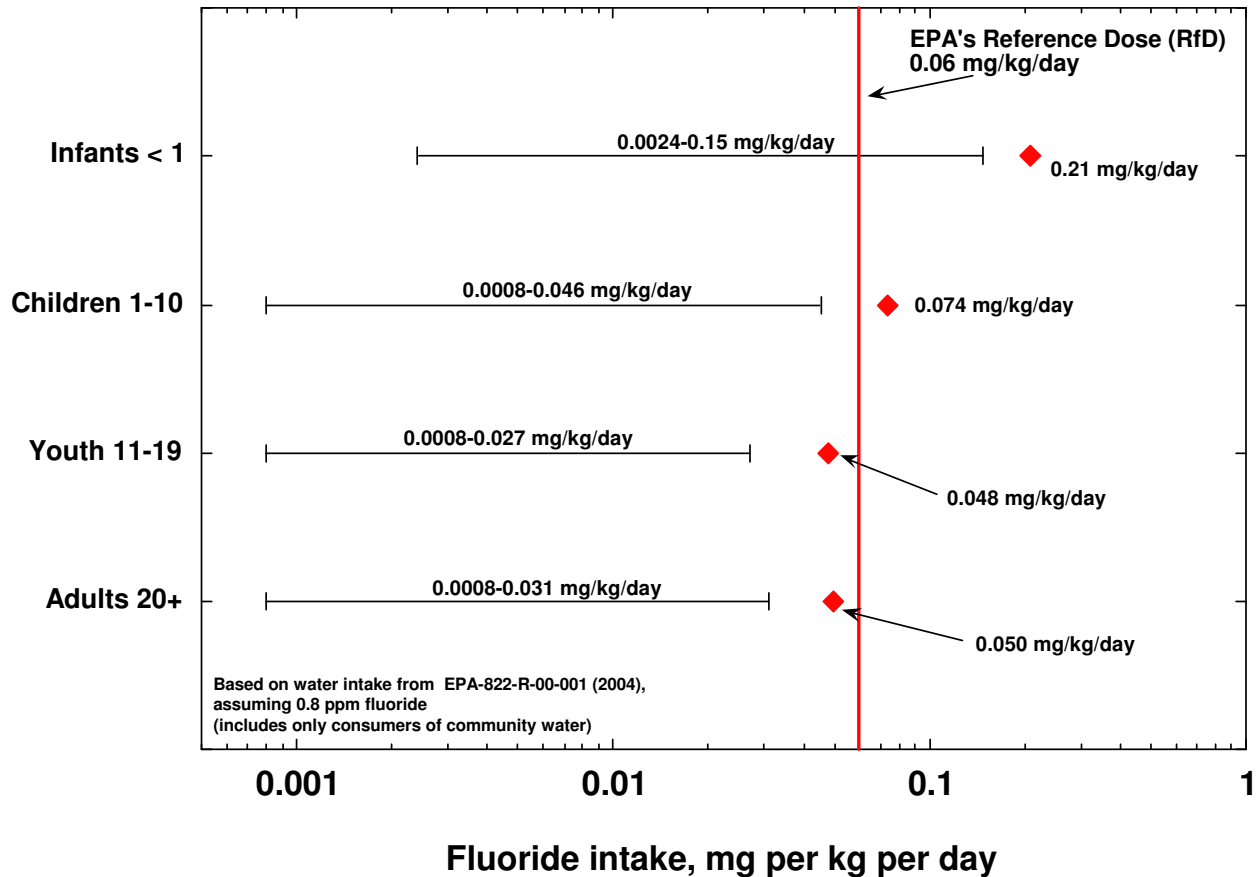
### Range of intake of community water, per unit body weight



The second graph shows the same information as in the first slide, but in terms of water intake per unit body weight (milliliters of community water intake per kg of body weight, or mL per kg per day). Note that infants have the highest tap water consumption per unit body weight, with some infants reaching more than 250 mL per kg per day.

In general, the people with the highest tap water intakes include babies fed formula made with tap water, people with certain medical conditions (e.g., diabetes insipidus, diabetes mellitus) or taking certain medications (e.g., lithium), people in unairconditioned residences in hot climates, people who work outside in hot climates or do heavy physical labor, and athletes.

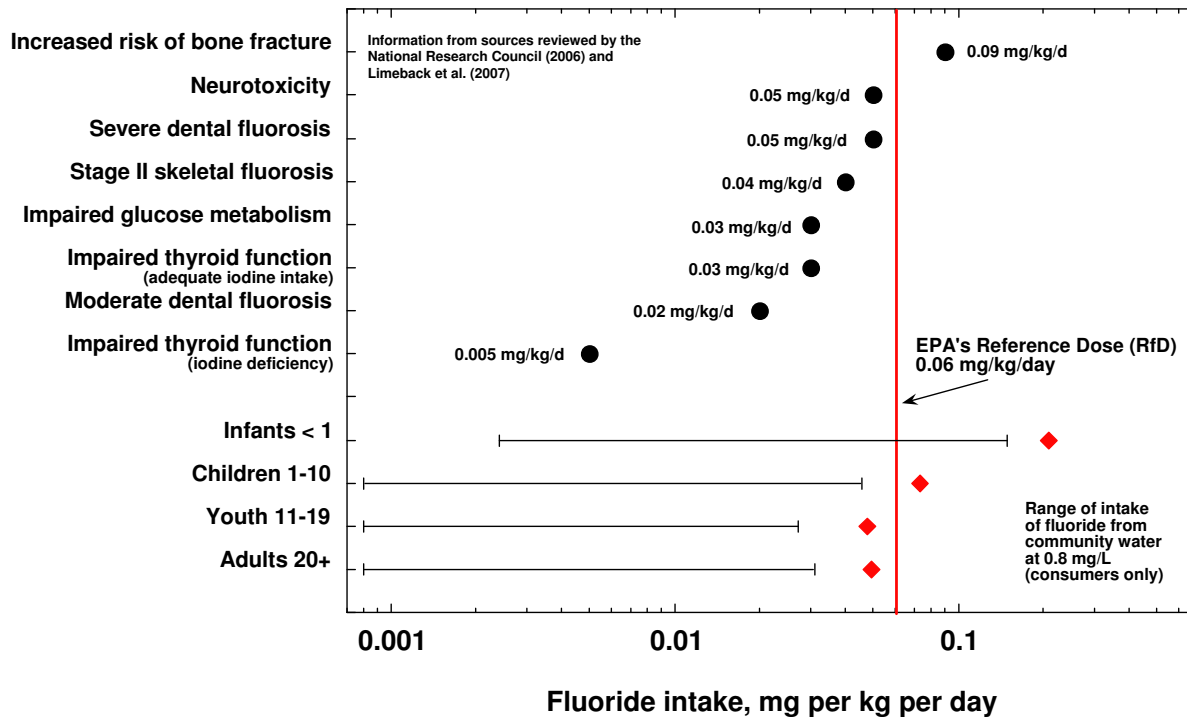
### Range of fluoride intake from community water, assuming 0.8 ppm fluoride in the water



The third graph shows estimated fluoride intakes for each age group (mg of fluoride per kg of body weight per day), assuming the range of tap water intakes shown in Slide 2 and a fluoride concentration in the tap water of 0.8 ppm (0.8 mg fluoride per liter of water). Also shown is EPA’s reference dose, which is defined as “an estimate of a daily oral exposure to the human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious effects during a lifetime.” For fluoride, the reference dose is 0.06 mg per kg per day. As seen in the graph, many infants have a fluoride intake just from tap water that exceeds EPA’s reference dose for fluoride. Children (ages 1-10) with high water consumption also exceed EPA’s reference dose. Older children (youth) and adults with high water consumption are very close to EPA’s reference dose.

Note that this graph shows estimated fluoride intakes only from tap water. These estimates do not include fluoride intakes from other sources, such as commercial beverages (which are often made with fluoridated tap water), toothpaste, tea, or food. When these other sources of fluoride intake are included, total fluoride intakes for many members of all age groups exceed EPA’s reference dose.

### Estimated "No-effect" levels in humans



The final graph shows the estimated fluoride intakes from tap water from Slide 3, plus estimates of the “no-effect” levels for various adverse health effects. These “no-effect” levels represent fluoride intakes at or below which most people are not expected to experience any harmful effects. Note that these estimates are based on average exposures of study populations; these estimates do not include any margin of safety, and they might not be protective for all individuals. Intakes above these levels cannot be considered safe.

Note also that most of these “no-effect” levels are lower than EPA’s reference dose for fluoride. In other words, EPA’s reference dose is not protective for most of these health endpoints.

Note also that most of these “no-effect” levels are exceeded by many members of the population, of all ages, just from fluoride at 0.8 ppm in community drinking water. When other fluoride sources are included, even more people are expected to exceed the “no-effect” levels. In order to be “safe” for all members of the population, fluoride intakes for all people must be kept below the lowest “no-effect” levels, when all sources of fluoride intake are included, and with an adequate margin of safety.

This list of adverse health effects does not include cancer. A carcinogenic (cancer-causing) effect of fluoride cannot be ruled out from the available data, and at the very least, a cancer-promoting effect is likely. For carcinogenic substances, the risk of cancer increases with the amount of exposure, such that even a very low exposure carries with it some cancer risk.

## 8. Ethical and Legal Concerns

Fluoride is dispensed as a drug in our drinking water, but it has never been approved as a drug in the U.S. (status of drug approval unknown in Canada).

“The Food and Drug Administration Office of Prescription Drug Compliance has confirmed, to my surprise, that there are no studies to demonstrate either the safety or effectiveness of these drugs which FDA classifies as unapproved new drugs.” Letter from Dr. David Kessler, M.D., Commissioner, United States Food and Drug Administration, June 3, 1993 to Congressman Kenneth Calvert, Chairman, Subcommittee on Energy and Environment, Committee on Science, Washington, D.C.



Photo: [www.fluoridealert.com](http://www.fluoridealert.com)

subject to Food and Drug Administration (FDA) regulation.” United States Food and Drug Administration letter Dec, 2000, to Congressman Kenneth Calvert, Chairman, Subcommittee on Energy and Environment, Committee on Science, Washington, D.C.

“In pharmacology, if the effect is local (topical), it’s awkward to use it in any other way than as a local treatment. I mean this is obvious. You have the teeth there, they’re available for you, why drink the stuff?” Dr. Arvid Carlsson, Nobel Laureate in Medicine, 2000



Photo: [www.fluoridealert.com](http://www.fluoridealert.com)

### **The Precautionary Principle: *If in doubt, leave it out***

"Government of Canada shall...(a) exercise its powers in a manner that protects the environment and human health, applies the precautionary principle that, where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation, and promotes and reinforces enforceable pollution prevention approaches;" Environment Canada: Toxic Substances Division.

“In the absence of comprehensive, high-quality evidence with respect to the benefits and risks of water fluoridation, the moral status of advocacy for this practice is, at best, indeterminate, and could perhaps be considered immoral.” H. Cohen and Dr. David Locker, Professor at U of T Faculty of Dentistry, Professor, Department of Community Dentistry, Faculty of Dentistry, University of Toronto, Director, Community Dental Health Services Research 2001 “The Science and Ethics of Water Fluoridation” Journal of Canadian Dental Association 67(10):578-80.

“The issue of mass medication of an unapproved drug without the expressed informed consent of each individual must also be addressed. The dose of fluoride cannot be controlled ....Individuals who are susceptible to fluoride's harmful effects cannot avoid ingesting this drug. This presents a medico-legal and ethical dilemma and sets water fluoridation apart from vaccination as a public health measure where doses and distribution can be controlled.” Dr. Hardy Limeback, Associate Professor and Head, Preventive Dentistry, Faculty of Dentistry, University of Toronto “Why I am now officially opposed to adding fluoride to water.” April, 2000 <http://www.slweb.org/bibliography.html#reviews>.

### **Are We Violating Our Own Rules?**

Additions of drinking water health hazards are not permitted. Dilution is no defence. Ontario Safe Drinking Water Act, section 20(1,3)

Violations of ANSI/NSF Standard 60 (see attached Stan Hazan testimony) are, by extension, violations of Certificates of Approval under the Ontario Safe Drinking Water Act and other provinces/territories in Canada. Ontario Safe Drinking Water Act, section 31(1), Section 6.1 Certificates of Approval.

### **Do We Want to Import Toxic Substances from China?**

Water fluoridation supplies are now coming from China. Dwindling supplies of fluorosilicates used in water fluoridation means that the replacement product could be shipped to us from China. e.g. “Kip Duchon (CDC) reported in 2007 that when U.S. Agrichemicals withdrew from the market in 2005, about half of U.S. sodium silicofluoride supplies began to be imported from a producer in China.” City of Boulder: Water Resources Advisory Board Agenda Item; Meeting; May 21, 2007.

## 9. Specific Questions to Government Officials

1. The US EPA classifies hydrofluorosilicic acid as a Class 1 hazardous waste. Is hydrofluorosilicic acid a Class 1 hazardous waste or equivalent in Canada?
2. Can Health Canada or any other government department point to any toxicology study or studies demonstrating safety of the fluorosilicate products used to fluoridate drinking water for more than 60 years? If so, would that department please provide a reference to or copy of such documented research?
3. Does Health Canada or any other federal government department believe that there is any legitimate government interest fulfilled by adding arsenic, lead, mercury, cadmium, barium, chromium and other contaminants which are bundled with hydrofluorosilicic acid, to our drinking water and hence our environment, in the process of water fluoridation? If so, how so?
4. Are Health Canada, Environment Canada and other government departments aware that inorganic arsenic, lead, mercury and inorganic fluorides (e.g., hydrofluorosilicic acid) are on the CEPA 2006 toxic substances list and that hydrofluorosilicic acid is not naturally present in the environment?
5. How many cases of osteosarcoma/bone cancer – the often fatal cancer associated with fluoride exposure – are reported in one year in Canada? Has Health Canada advised the Canadian Cancer Society of the increased risks for bone cancer associated with water fluoridation? If not, why not?
6. Does Health Canada have current information regarding the incidence of dental fluorosis in Canada? If so, please provide data or source of data. If not, will Health Canada request this information from the Canadian Dental Association?
7. What is the average cost to repair dental fluorosis for an individual? Will Health Canada see to it that those who are harmed by water fluoridation are appropriately reimbursed?
8. Is any federal government department aware that these chemical additions are allegedly violating NSF Standard 60 and the Safe Drinking Water Act [SDWA] of Ontario and similar acts of other jurisdictions? What other provincial and territorial acts are being violated by fluoridation chemicals? Does Health Canada, environment Canada or any other federal government department have a mechanism for investigating such alleged violations?
9. In the absence of safety studies, does any Canadian government department feel comfortable in claiming that hydrofluorosilicic acid is safe? In the absence of safety studies on the products used in water fluoridation, how do you justify your actions to promote the use of a hazardous waste product that has never been tested for safety?
10. According to the Ontario Ministry of Health & Long Term Care 1999 report, 20 to 75% of individuals in fluoridated communities have dental fluorosis. 12 to 45% of individuals in

non-fluoridated communities have dental fluorosis. The Chief Dental Officer for Canada is quoted as saying: "Fluorosis is not caused by Water Fluoridation"<sup>150</sup>. Would the CDO please explain how and why his opinion differs so much from the Ontario Ministry of Health, NRC 2006 Report, EWG 2006 and NAS Report, [page 21 above]. reports? Will the government of Canada conduct a peer-review study to determine who is correct?

11. According to NRC reports, ATSDR reports and other sources those who drink more than average quantities of water (e.g. kidney disease patients, diabetic patients, lactating mothers) are at risk for fluoride toxicity. The Dental Officer of Health for Halton, Ontario states: "Even if you drink a whole lot of water it's impossible to overdose if water is fluoridated at the optimal level" *Oakville Beaver*, April 13, 2007. Would the government of Canada conduct a peer-review study to determine who is correct?
12. Is Health Canada genuinely capable of providing an estimated range of total daily water ingestion of fluoride by infants and children, by age, in all artificially fluoridated communities in Canada who use your recommended guideline of 0.8mg/L – 1.0mg/L? If Yes, please submit the data specific to this request and the source for the estimates. If No, please so state.
13. Is Health Canada genuinely capable of providing an estimate for the full range of daily water ingestion of fluoride, by consumers of fluoridated water who use your recommended guideline of 0.8mg/L – 1.0mg/L, including specific ranges for labourers, athletes, the excessively thirsty such as those individuals with diabetes, and those encouraged by health professionals to use water for health or detoxifying purposes? If Yes, please submit the data specific to this request and the source for the estimates. If No, please so state.
14. Can any Canadian or provincial government department or agency force an individual to be medicated with a substance that has not been specifically approved for the purpose it is intended, and especially approved in the manner it is administered? Does the approval of one substance, or manner of delivery, translate to an approval for another similar substance or different mode of delivery?
15. Is fluoride considered to be a drug that is subject to Health Canada or any other regulation(s)?
16. Have fluorosilicates ever been approved as a drug in Canada?
17. Do fluorosilicates have a Drug Identification Number [DIN]?
18. As fluoride is not removed by simple carbon filtration, what is the estimated cost for installation and yearly maintenance for a drinking water system that adequately filters fluoride [e.g. reverse osmosis, distillation]? Please identify your source.
19. Who should pay the cost for installation and maintenance of any fluoride removal system for a consumer identified in government scientific literature as unusually susceptible to fluoride's adverse health effects, i.e., the consumer, an entity promoting or endorsing fluoridation, the local dental society, the Canadian Dental Association, an insurance company, the water system operator, the department of health, etc?

20. Does Health Canada provide documentation of known sources of fluoride exposure in foods and beverages? If not, why not?
21. Do government departments such as Fisheries and Wildlife, Natural Resources, Environment Canada have any duty to inform those involved in fisheries and wildlife of the inherent risks of water fluoridation to our ecosystem?
22. There is ample evidence that fluoride interferes with the body's ability to utilize essential nutrients such as calcium, magnesium, iodine, etc. via various metabolic pathways, [see NRC Canada 1977, US NRC 2006]. Is fluoride an essential nutrient? If so, please provide evidence. If not, does Health Canada or any other federal government agency have adequate grounds to justify that purported benefits of fluoridation of drinking water should outweigh and compromise the good nutrition of our citizens?
23. Does Health Canada believe that statements of endorsement for the public policy of fluoridation also are endorsements for use of the products actually used for water fluoridation?
24. Derivation of the Maximum Allowable Contaminant levels [MACs] is based largely on the level of carcinogenicity assigned to a toxic substance; 1) carcinogenic; 2) probably carcinogenic; 3) possibly carcinogenic; 4) probably not carcinogenic. What classification was given to fluoride? Why?
25. Is Health Canada aware of the following quote by a report by the Ontario Ministry of Health & Long Term Care 1999: "Efforts are required to reduce (fluoride) intake among the most vulnerable age groups, children aged 7 months to 4 years..."? Does Health Canada have evidence that their initiative to reduce the recommended guideline from 1.0-1.2 mg/L to 0.8-1.0 mg/L in 1999 has significantly reduced fluoride exposures in vulnerable populations and significantly reduced associated health risks, such as bone cancer [especially in young men between the ages of 6-20], dental fluorosis ["mottled teeth"], thyroid suppression, etc? Please provide references.
26. Does Health Canada acknowledge that *timing* of the fluoride exposure, and *vulnerability* of the child to fluoride exposure are important in fluoride toxicity?
27. In regard to the statement made by Health Canada; "There are no studies indicating an association between fluoridated water in reconstituted infant formula and moderate or severe dental fluorosis", is anyone at Health Canada aware of the 56 studies<sup>48-108</sup> demonstrating an association between the use of fluoridated water use in reconstituted infant formula and the risk of dental fluorosis of varying severity? If not, why not?
28. Is Health Canada aware that the American Dental Association, The Academy of Dentistry, the Center for Disease Control have all issued advisories on their websites in letters, recommending that parents should not give children under the age of 1 year fluoridated water mixed with infant formula? Not all parents have computers or visit these particular websites. The concerns of fluoridated water and fluoridated toothpaste mentioned in the September 20, 2000 letter from the Ontario Ministry of Health has not been conveyed to the general public. Is it the intent of Health Canada to inform parents in Canada of these concerns? If not, why not?

29. With the publication of the NRC 2006 Report, and evidence contained therein that endocrine systems and thyroid functions are impaired at exposure levels to fluoride below the consumption levels expected from drinking “optimally fluoridated water”, what does Health Canada or any other federal department, plan to do to inform the consumer of such risks to their health?
30. Is Health Canada aware that the US NRC 2006 Review states that 0.7mg/day with a 75kg individual, of ingested fluoride, when iodine insufficient, may cause thyroid suppression? If so, why is Health Canada permitting the additions of an inorganic fluoride such as hydrofluorosilicic acid in our drinking water, which account for most of our total fluoride consumption<sup>109</sup>? What does Health Canada intend to do to protect the population from iodine deficiency and fluoride over-exposure, which in combination, apparently leads to increasing numbers of people with thyroid insufficiency?
31. Is Health Canada aware that doctors in Europe from 1930-1970 used fluoride to suppress thyroid function?<sup>110-116</sup>
32. Is Health Canada aware that ethnicity also seems to be important in regards to toxicity of fluoride exposure? E.g. Moderate to severe dental fluorosis is found in many black and aboriginal children whose cumulative dose from fluoridated water and foods processed in fluoridated water is identical to poor white children with milder cases of fluorosis.
33. The protection of minorities is enshrined in the Canadian Charter of Rights and Freedoms, section 15, Equality Rights. Do Health Canada and relevant government agencies have an obligation to protect these minorities with regard to fluoridation of drinking water and the dispersal?
34. In regard to the statement made by Health Canada: “Possible higher exposure in the first year would be mitigated by lower exposures in the subsequent two years of life.” According to the NRC 2006 Report, p21, dental fluorosis cannot be reversed by lowering the intake of fluoride after the exposure; “The condition is permanent after it develops in children during tooth formation, a period ranging from birth until about the age of 8.” Would Health Canada please explain how and why they differ from the evidence of the NRC 2006 report? Please provide peer-reviewed scientific evidence of this claim.
35. In regard to the statement made by Health Canada: “Fluoride must still meet standards of purity and quality before it is used in drinking water treatment,” This product is bundled with many toxic substances such as arsenic, lead, cadmium, mercury, etc. Does this product meet Health Canada’s standard for purity and quality? If so, how so? If not, why does Health Canada make this claim?
36. In regard to the statement made by Health Canada on their website: “Public water fluoridation has been ranked one of the top ten public health measures of the twentieth century by the World Health Organization”; Will Health Canada provide the WHO documentation to support the above statement? If not, why does Health Canada use this quote on their website?
37. Will the Government of Canada commit to establishing long-term health based objectives for drinking water contaminants, similar to the Maximum Contaminant Level Goals (MCLGs) established by the U.S. Environmental Protection Agency? If not, why not?

# 10. Recommendations to Government Officials

1. Will Health Canada immediately prohibit any dental association, medical association or public health organization from promoting water fluoridation until a parliamentary committee has had a chance to review the accumulated peer-reviewed evidence which documents the public health concerns, environmental concerns, ethical concerns and legal concerns associated with water fluoridation? If not, why not?
2. Will the Department of Justice and the Public Accounts Office please investigate these potential legal violations and their implications to taxpayers, of NSF Standard 60, the Safe Drinking Water Act, the Fisheries Act and other relevant government legislation? If not, why not?
3. Will Health Canada organize immediately a public education campaign to offset the misconceptions the public has about the safety and efficacy of fluoride, when ingested, at recommended doses in drinking water?
  - Will Health Canada inform the public, dental and public health officials of the correct mode of action of fluoride; purported benefits are topical [applied directly to the surfaces of the teeth], not systemic [swallowed]? If not, why not?
  - Has Health Canada advised parents of young children [especially under the age of one] explicitly not to use fluoridated drinking water? If not, why not?
  - Has Health Canada advised those who are unable to adequately filter fluoride of their higher risks associated with water fluoridation [e.g., young children, elderly, kidney patients, diabetic patients, Walkerton, Ontario residents with impaired kidney function]? If not, why not?
  - Has Health Canada advised those who drink larger than normal quantities of water [e.g. athletes, lactating mothers, soldiers, diabetic patients] of the higher risks associated with water fluoridation? If not, why not?
  - Has Health Canada advised those with poor nutrition [e.g., calcium, magnesium, iodine, selenium] of their higher risks associated with water fluoridation [see ATSDR, NRC Canada 2007, NRC 2007]? If not, why not?
  - Have those working with Fisheries and Oceans, Natural Resources, Environmental Agency advised those involved with fisheries of the inherent risks of water fluoridation to many species of fish and the insects upon which they feed? If not, why not?
  - Will the Government of Canada commit to starting national bio-monitoring studies to regularly identify and track the exposure of Canadians to fluoride by testing blood, urine, saliva, etc.? If not, why not?
  - Would Health Canada enhance their website to include pictures of dental fluorosis so that the population and dentists can better identify this health concern?
  - Will Health Canada instruct the manufacturers of fluoridated toothpaste and mouthwash to put warning labels similar to the FDA warnings in the USA?

4. Testimony under oath to the US Congress by National Sanitation Foundation indicates that NSF is violating its own Standard 60 requirements for chemical additives. [see Stan Hazan testimony] NSF is certifying companies which are not in full compliance with Standard 60. [section 3.2.1 requires full and accurate documentation of all impurities in these products and maximum percent or parts by weight, CAS number, chemical name, toxicology studies, selected spectra, etc.]
- How can Environment Canada, Natural Resources, Transport Canada, Fisheries and Oceans, Public Health Agency, Indian and Northern Affairs, Public Health Agency, Environmental Assessment Agency or other relevant government agencies ensure that the public and the environment will be adequately protected from an accidental spill of this product [hydrofluorosilicic acid] if Standard 60 information is not available for the NSF-certified products?
  - How can emergency response workers be protected from potential accidents if the content of these products is not fully disclosed?

## **11. Federal Departments and Agencies that Need to Respond**

- Canadian Environmental Assessment Agency
- Environment Canada
- Fisheries and Oceans Canada
- Health Canada
- Indian and Northern Affairs
- Natural Resources Canada
- Parks Canada
- Public Health Agency of Canada
- Public Safety Canada
- Transport Canada
- Department of Justice
- Public Accounts
- All other related ministries

## **12. Appendices**

- Certificate of Analysis: LCI Ltd
- NSF-Stan Hazan Congressional Testimony
- Bassin 2006 Age-specific fluoride exposure in drinking water and osteosarcoma

## 13. References

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