

**Health Canada Response to
Environmental Petition 221C filed by Ms. Carole Clinch
under Section 22 of the *Auditor General Act*
Received April 29, 2008**

**Petition for the discontinuation of the addition of toxic substances to our
drinking water (inorganic fluorides, inorganic arsenic, lead)**

August 27, 2008

**Minister of Health and the Minister for the Federal Economic
Development Initiative for Northern Ontario**

Background:

Health Canada works with the provinces and territories to develop the Guidelines for Canadian Drinking Water Quality. The Guidelines are then used by each province and territory as a basis to establish their own requirements for drinking water quality. Fluoride is one of the many substances for which a guideline has been established. The Maximum Acceptable Concentration (MAC) for fluoride has been established taking into consideration all sources of exposure to fluoride, including foods and dental products. In Canada, the fluoridation of drinking water supplies is a decision that is made by each municipality, in collaboration with the appropriate provincial or territorial authority. This decision may also include consultation with residents, often through a referendum.

Fluoride occurs naturally in many source waters in Canada. It can also be added to drinking water as a public health measure to protect dental health and prevent or reduce tooth decay. The fluoridation of drinking water supplies is a well-accepted measure to protect public health and is strongly supported by scientific evidence. Fluoride is used internationally to protect dental health. It has been added to public drinking water supplies around the world for more than half a century, as a public health/dental health measure. The use of fluoride in the prevention of dental caries continues to be endorsed by over 90 national and international professional health organizations including Health Canada, the Canadian Dental Association, the Canadian Medical Association, the World Health Organization and the Food and Drug Administration of the United States.

As part of its ongoing review of the health effects of exposure to fluoride in drinking water, Health Canada convened a panel of experts in January 2007 to provide advice and recommendations based on the current state of relevant science with respect to the fluoridation of water. Advice was sought from the Expert Panel on five specific issues of concern including Total Daily Intake of Fluoride; Dental Fluorosis; Other Health Effects; Risk Assessment; and Drinking Water Fluoridation: Risks and Benefits. Discussions were based on topic-specific literature reviews developed and presented by some of the invited experts.

The report produced by the Expert Panel will be used to help inform the development of an updated fluoride guideline for Canadian drinking water, by ensuring our analysis is based on the latest scientific evidence. The Expert Panel report was posted online and can be found at <http://www.hc-sc.gc.ca/ewh-semt/pubs/water-eau/2008-fluoride-fluorure/index-eng.php>.

Health Canada will continue to monitor the science and review new scientific reports and articles which explore possible links between fluoride and various health effects to ensure the health of Canadians is protected.

1. *Dental fluorosis is caused by fluoride damage to the cells (ameloblasts) making tooth enamel during tooth formation. Does Health Canada believe that damaging the tooth enamel is beneficial?*

Exposure to fluorides has benefits but in some cases may lead to fluorosis of varying degrees. Dental fluorosis can be classified in a number of ways. One of the most universally accepted classifications, and the one used in this document, was developed by H.T. Dean in 1942. The individual's fluorosis score is based on the severest form of fluorosis recorded for two or more teeth. Dean's Index is described in the table below:

Classification	Criteria - Description of enamel
Normal	Smooth, glossy, pale creamy-white translucent surface
Questionable	A few white specks or white spots
Very mild	Small opaque, paper-white areas covering less than 25% of the tooth surface
Mild	Opaque white areas covering less than 50% of the tooth surface
Moderate	All tooth surfaces affected; marked wear on biting surfaces; brown stains may be present
Severe	All tooth surfaces affected; discrete or confluent pitting; brown stain present

Questionable, very mild and mild fluorosis have no effect on tooth form or function and may make the tooth enamel more resistant to decay. The end-point for cosmetic concern for fluoride is considered to be moderate dental fluorosis. The actual prevalence of moderate dental fluorosis in Canada is low, and all evidence suggests that since 1996 there has been an overall decreasing trend of moderate dental fluorosis in Canada. In the United States, where the optimal level of fluoride in drinking water is between 0.7 and 1.2 mg/L, (in Canada the current optimal levels are between 0.8 and 1.0 mg/L) approximately 10% of dental fluorosis is attributable to water fluoridation and is in the very mild or mild fluorosis categories, neither of which would be of cosmetic concern.

Health Canada endorses the fluoridation of drinking water at optimal levels, as defined in the Guidelines for Canadian Drinking Water Quality, in order to prevent tooth decay. The decision to fluoridate a water supply is made by provincial and territorial governments, in collaboration with their municipalities.

2. *Ingested fluoride and fluorosilicates go to every cell in the body – not just the teeth. A peer-reviewed study by Susheela et al 2005 demonstrates that even children with no dental fluorosis experience thyroid derangement with fluoride use. Can Health Canada prove that this ingested fluoride does not harm other parts of the body when it harms the teeth?*

Based on currently available published scientific literature, the weight of evidence does not support the claim that fluoride can cause adverse health effects, such as cancer, bone disease or

hypothyroidism. Health Canada's conclusions are based on internal scientific reviews of original relevant scientific studies that are published in internationally recognized peer-reviewed journals.

3. *In a previous petition (#221) Health Canada claims that: "In Canada, it is the use of fluoridated toothpaste or fluoride supplements at the critical age which is of greater concern." Dental fluorosis is due to total over-exposure of fluoride when teeth are developing. According to the NRC 2006 Report fluoridated water is the single largest source of fluoride exposure. How does Health Canada calculate that only 10% of dental fluorosis is attributable to water fluoridation which provides the majority (approximately 60%) of fluoride exposure? Why is fluoridated toothpaste or fluoride supplements a "greater concern" for fluoride over-exposure when the GREATER 7 EXPOSURE of fluorides is from fluoridated water? Please provide calculations and references.*

Health Canada has taken into account exposure to fluoride from all sources to determine the maximum acceptable and optimal concentrations in drinking water. For further information, please consult the Guideline Technical Document on Fluoride available on the Health Canada website. <http://www.hc-sc.gc.ca/hl-vs/iyh-vsv/environ/fluor-eng.php>

4. *In a previous petition (#221) Health Canada claims that since 1996 there has been an overall decreasing trend of moderate dental fluorosis in Canada. The NHANES reports from the USA show a significant increase of dental fluorosis in the USA – (an increase of 9 %) compared to 1980. Recent data shows that dental fluorosis has increased dramatically in the Niagara Region. Clark et al 2006 demonstrates that when water fluoridation is DISCONTINUED there is a decrease in dental fluorosis. Is Health Canada referring to a decrease in dental fluorosis in communities which stop fluoridating? Would Health Canada please provide evidence of declining rates of dental fluorosis?*

The actual prevalence of moderate dental fluorosis in Canada is very low, and all evidence suggests that there has been an overall decreasing trend of moderate dental fluorosis in Canada since 1996. This is based on a review of Canadian data conducted by Clark et al 2006.

5. *In a previous petition (#221) Health Canada claims that "There is no cost associated with questionable, very mild or mild fluorosis as these affect neither tooth function nor cosmetic aspects." Does Health Canada deny the existence of the procedures and costs outlined above for polishing, bleaching, microabrasion, porcelain veneers and crowns used by many individuals to ameliorate the damage done to their teeth from overexposure to fluorides?*

Health Canada does not deny the existence of cosmetic procedures and related costs. However, mild to moderate dental fluorosis does not affect tooth function nor does it lead to any functional or disease issues that would require dental treatment. In some cases of moderate dental fluorosis, an individual may choose to undergo cosmetic treatment.

6. *Why does Health Canada deny that very mild or mild dental fluorosis is socially*

embarrassing and a “cosmetic concern”? Would anyone at Health Canada like to speak with some of the individuals who have spent thousands of dollars on these treatments and endured the social embarrassment and see if they agree that dental fluorosis does not affect “cosmetic aspects”?

The assessment of “cosmetic concerns” remain a personal choice and is therefore outside the mandate of Health Canada.

7. *Is Health Canada aware that dental fluorosis is associated with higher incidence of dental cavities?*

Current science shows that fluoridation at optimal concentrations prevents dental caries. The references you have provided all look at situations in developing countries, where the state of dental health is not comparable to the Canadian situation, and levels of naturally-occurring fluoride are significantly higher than the Canadian Maximum Acceptable Concentration.

8. *In a previous petition (#221) Health Canada states: “Due to the low occurrence of fluorosis of cosmetic concern”. The 2002 US NHANES survey shows that dental fluorosis rates in the USA, (which uses artificial fluoridation concentrations which are virtually identical to Health Canada) for very mild to mild dental fluorosis rates are 25%, moderate dental fluorosis rates are 10% and severe dental fluorosis rates are about 1% which a total of 36%. Is it the opinion of Health Canada that a dental fluorosis rate of 25% (very mild and mild dental fluorosis) or 36% (all dental fluorosis) is a “low occurrence”?*

As mentioned earlier, the end-point for cosmetic concern is considered to be moderate dental fluorosis. Moderate dental fluorosis would not lead to any functional or disease issues that would require dental treatment. In some but not necessarily all cases of moderate dental fluorosis an individual may decide that cosmetic treatment is necessary. The actual prevalence of moderate dental fluorosis in Canada is low, and all evidence suggests that since 1996 there has been an overall decreasing trend of moderate dental fluorosis in Canada.

It is also important to note that comparisons between Canada and other countries regarding the levels of exposure should be done with caution, as dental fluorosis rates will depend on a number of factors, which include the geographical area, water fluoridation, diet, use of fluoridated dental products, use of nutritional supplements, general state of health, etc.

9. *Will Health Canada or the Public Health Service please provide incidence figures for mild, moderate and severe dental fluorosis in Canada as previously requested?*

11. *Will Health Canada or the Public Health Service please provide incidence figures of dental fluorosis comparing fluoridated to unfluoridated communities in Canada?*

Answer to Questions 9 & 11:

Health Canada and the Public Health Agency of Canada do not compile such information. As previously indicated, these figures are not available. You may be able to find some information in published scientific literature.

10. *According to the Ontario Ministry of Health 1999 Review, dental fluorosis is twice as prevalent in fluoridated communities (20 to 75%) compared to non-fluoridated communities (12 to 45%). Does Health Canada believe that these prevalence rates are “very low”?*

It is not appropriate for Health Canada to provide an opinion on a review from another agency.

12. *Is Health Canada aware of the study by Clark 2006 which stated: “When fluoride was removed from the water supply in 1992, the prevalence and severity of TFI scores decreased significantly from the 1993-94 survey cycle when compared with the 1996-97 and 2002-03 survey cycles.”? Does Health Canada dispute the evidence by Dr. Clark that dental fluorosis drops significantly when water fluoridation is discontinued?*

Health Canada is aware of this study, which includes additional information and conclusions regarding fluoridation. It is expected for dental fluorosis rates to drop if fluoridation is discontinued; so do the beneficial effects from fluoride.

13. *Is Health Canada aware that Dean, considered to be the Father of Water Fluoridation, advised that when the average child in a community has mild fluorosis, “. . . it begins to constitute a public health problem warranting increasing consideration” (Dean 1942, p. 29).” NRC 2006 p 106? Does Health Canada disagree with Trendley Dean?*

It is not appropriate for Health Canada to comment on an individual’s opinion. Our conclusions are based on internal scientific reviews of original relevant scientific studies that are published in internationally recognized peer-reviewed journals

14. *Should the parent pay the costs of dental fluorosis because they allowed their child drink oodles and oodles of water like they are told in health magazines or because they were not informed by anyone that there really is way too much fluoride in the food chain, as described in a recent Scientific American article, January 2008?*

There is no cost associated with questionable, very mild or mild fluorosis as these affect neither tooth function nor cosmetic aspects. As mentioned earlier, the end-point for cosmetic concern is considered to be moderate dental fluorosis. Moderate dental fluorosis would not lead to any functional or disease issues that would require dental treatment.

15. *In a previous petition (#221) Health Canada states that: “water fluoridated at an optimal level would not lead to dental fluorosis” Does Health Canada understand the difference between concentration (mg/L) and dose (mg/day)? If so, explain how concentration levels provide you with accurate information about the dose of fluoride received in a day. Refer to above fluoride dose calculator for assistance.*

Health Canada has taken into account exposure to fluoride from all sources to determine the maximum acceptable and optimal concentrations in drinking water. For further information, please consult the Guideline Technical Document on Fluoride available on the Health Canada website. <http://www.hc-sc.gc.ca/ewh-semt/pubs/water-eau/fluoride-fluorure/index-eng.php>

16. *In a previous petition (#221) Health Canada states that: “As with any medical condition, moderate to severe dental fluorosis should be identified by trained professionals and not by the general public.” Does Health Canada suggest that the public has no right to understand the phenomenon of dental and skeletal fluorosis? Does Health Canada believe that the very visible tooth mottling caused by fluoride exposure is too difficult for a lay person to see and assess? Or does Health Canada believe that it is too difficult for a lay individual to count the number of teeth damaged by dental fluorosis, once it is identified?*

Self-diagnosis is never recommended. As indicated in an earlier response, dentists and other health professionals have access to scientific and medical documents to identify issues such as moderate to severe dental fluorosis. If an individual is concerned about their personal health, they should speak to their dentist or other health care provider.

17. *In a previous petition (#221) Health Canada states: “Health Canada has the position that fluoride supplements should not be used and that children under age 3 should not use fluoridated tooth paste unless deemed appropriate by a health professional assessed on an individual basis.” A glass of artificially fluoridated water contains the same amount of fluoride as a “pea-sized amount of toothpaste” which Health Canada recommends not be swallowed. A glass of artificially fluoridated water also contains unmeasured amounts of fluorosilicate compounds which are more toxic than “fluoride ions”. Please keep in mind that the amount of fluoridated water or fluoridated food consumed by any individual in a day cannot be controlled. Why does Health Canada deem a controlled dose of pharmaceutical grade fluoride supplements and fluoride toothpaste to be inappropriate for ingestion yet drinking the industrial grade fluorosilicate compounds and their released fluoride ions is appropriate?*

Health Canada has taken into account exposure to fluoride from all sources to determine the maximum acceptable and optimal concentrations in drinking water. For further information, please consult the Guideline Technical Document on Fluoride available on the Health Canada website. <http://www.hc-sc.gc.ca/ewh-semt/pubs/water-eau/fluoride-fluorure/index-eng.php>

Water that is optimally fluoridated does not pose a problem with respect to moderate fluorosis for any age group and does not create a need to advise parents of a health concern. Rather, it is the use of fluoride supplements and the ingestion of fluoridated toothpaste during the critical ages that is of concern. As a result, Health Canada is recommending the following steps to minimize exposure in small children:

- Never give fluoridated mouthwash or mouth rinses to children under six years of age, as they may swallow it.
- Talk to your dentist before using fluoridated mouthwash.
- Health Canada does not recommend the use of fluoride supplements (drops or tablets).

- Make sure that your children use no more than a pea-sized amount of toothpaste on their toothbrush, and teach them not to swallow toothpaste. Children under six years of age should be supervised while brushing, and children under the age of three should have their teeth brushed by an adult without using any toothpaste.

18. *According to a patent for fluoridated toothpaste which : “A method for preventing dental caries by administering fluoride and, at the same time controlling periodontal bone loss precipitated by the fluoride, by providing a combination of fluoride and NSAID is disclosed.” & “fluoride, in the concentration range in which it is employed for the prevention of dental caries, stimulates the production of prostaglandins and thereby exacerbates the inflammatory response in gingivitis and periodontitis”. (Aberg et al. 1998) Is Health Canada familiar with the research showing that fluoride causes gingivitis and periodontitis? If not, why not?*

Based on currently available published scientific literature, the weight of evidence does not support the claim that fluoride can cause such adverse health effects.

Health Canada has taken into account exposure to fluoride from all sources to determine the maximum acceptable and optimal concentrations in drinking water. For further information, please consult the Guideline Technical Document on Fluoride available on the Health Canada website. <http://www.hc-sc.gc.ca/ewh-semt/pubs/water-eau/fluoride-fluorure/index-eng.php>

19. *Is Health Canada familiar with the US Centers for Disease Control 2002 report <http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5250a3.htm> showing that “The prevalence of edentate persons (i.e., those who have lost all their natural teeth) ranged from 13% in Hawaii and California to 42% in Kentucky.” ? 100% of Kentucky receives artificial water fluoridation; 8.8% of the population in the state of Hawaii was 9 fluoridated; 27.7% of the population in the state California was fluoridated. In other words, the highest rates of tooth loss occur in the states with the highest rates of water fluoridation. The lowest rates of tooth loss occur in the states with the lowest rates of water fluoridation. Does Health Canada dispute this CDC evidence that water fluoridation did not help to protect the population from tooth disease and tooth loss?*

As indicated previously, Health Canada cannot comment on reviews from other agencies. It is important to exercise caution in interpreting such data – tooth disease and tooth loss can be caused by a variety of factors and conditions, and coincidental data cannot be interpreted as either evidence or proof, which would require a direct cause-effect relationship to be established.

20. *“Electron microscopy revealed that fluoride ions could interrupt the crystal nucleation process, resulting in crystal perforation in the developing tooth enamel and the presence of amorphous minerals in bone crystals. Furthermore, the results of enzymatic analyses indicated that fluoride directly interfered with the synthesis of carbonic anhydrase by the enamel-forming cells [ameloblasts]” Does Health Canada have evidence which demonstrates that the conclusions by Kakei and cohorts are incorrect?: “regardless of its amount, fluoride intake has harmful effects on both tooth and bone formation.” Kakei M,*

Sakaeb T, Yoshikawa M, Tamurad N. 2007 Effect of fluoride ions on apatite crystal formation in rat hard tissues. Annals of Anatomy 189: 175—181.

Health Canada recognises that there is ongoing research in the scientific community with regards to the exact mechanism of action of fluoride on tooth structure. Health Canada's fluoride expert panel determined that the end-point for cosmetic concern for fluoride is considered to be moderate dental fluorosis on the Dean's Index. Further information can be found at <http://www.hc-sc.gc.ca/ewh-semt/pubs/water-eau/2008-fluoride-fluorure/index-eng.php>. The actual prevalence of moderate dental fluorosis in Canada is low, and all evidence suggests that since 1996 there has been an overall decreasing trend of moderate dental fluorosis in Canada.