

# Pro and Con Analysis of Continuation of City of Fort Collins Water Fluoridation

Health District of Northern Larimer County Board of Directors April 22, 2003 Meeting

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## Background on fluoride

Fluoride is found naturally in water supplies across the United States and the world. Natural levels vary by water source: untreated water from the City of Fort Collins's two water sources, the Cache La Poudre River and Horsetooth Reservoir, range from .15 to .25 mg/L.

Fluoride was found to prevent dental caries (cavities) in the early part of the last century. Trials conducted in the 1940s and subsequent testing found that adding fluoride to municipal water supplies at 1 mg/L (when community water supplies were not already fluoridated at that level) resulted in a 50-70% reduction in dental caries in children. Following these findings, community water fluoridation programs grew in the United States and across the developed world.

The prevalence of community fluoridation programs varies by state. According to the Centers for Disease Control and Prevention, 65% of the US population served by public water systems receive optimally fluoridated water. One of the Healthy People 2010 objectives for oral health is to increase this percentage to 75%. A sample of states follows below:

Utah — 2%  
Wyoming — 30.3%  
**Colorado — 76.9%**  
Iowa — 91.3%  
Washington DC — 100%

In addition to the fluoride naturally found in and added to the City's water supply, local residents may receive fluoride through:

- Toothpaste, topical gels, mouth rinses and fluoride supplements
- Foods and beverages with naturally occurring fluoride or made with fluoridated water

## Background on the City of Fort Collins fluoridation program

The City of Fort Collins has been adding fluoride to the municipal water supply since 1967. The fluoridation program, authorized by a citizen vote, utilized dry sodium silicofluoride until 1992, when the City changed to a liquid form of fluoride called hydrofluorosilicic acid.

The Fort Collins area has three other water utilities: East Larimer County Water District, Fort Collins-Loveland Water District and the North Weld County Water District. Currently the City of Fort Collins and the other three water utilities fluoridate at 1 mg/L.

In 2001 the City of Fort Collins Water Board recommended that the City cease its water fluoridation program after what could be characterized as a limited review of literature about fluoridation. In response, the City of Fort Collins convened the Fluoride Technical Study Group (FTSG) to explore in depth the costs and benefits of community water fluoridation. Nine community members were chosen to review existing information and summarize the scientific evidence of the risks and benefits of community water fluoridation. Included in membership were one representative from the City of Fort Collins Water Board, one from the Larimer County Board of Health, one pro-fluoridation advocate, one anti-fluoridation advocate, two representatives from Fort Collins Utilities, and three community members with scientific and medical expertise.

The study group completed their report in April 2003, titled "Report of the Fort Collins Fluoride Technical Study Group." This report will be considered by the Board of Health and the Water Board, which will forward recommendations to the City Council on whether to continue the City's current fluoridation program. The City Council will make the final decision.

### **Why is this issue important?**

Dental caries are an infectious disease that can result in destruction of tooth structure. According to the Community Preventive Services Task Force, dental caries remains the most common of chronic childhood disease, five times more common than asthma. A survey of third grade children conducted in 2002 for the Oral Health Program of CDPHE by Health District staff found that one in three third graders in schools serving lower income populations had evidence of untreated caries. Individuals living in poverty are three times more likely to have untreated disease than those who are not poor. Dental decay is not a benign condition. Untreated caries can lead to abscess formation, systemic infection and tooth loss.

Over the past five decades, dental caries incidence has fallen by more than 50% in this country. Since then, many studies evaluating both the role of fluoridation in caries prevention and the presence or absence of associated side effects (both negative and positive) have been completed. Review of this new information is important.

### **About this analysis**

This pro and con analysis was produced by Health District policy staff to assist the Health District Board of Directors in their consideration of the City's fluoridation program. It was produced both independent of and subsequent to the Technical Study Group's findings. It should be noted that the FTSG report is quite comprehensive in its review of fluoridation; readers of this analysis are encouraged to read the executive summary of the FTSG report or the entire report.

For a copy of the complete report, visit <http://www.ci.fort-collins.co.us/utilities/fluoride-report.php> or call the City of Fort Collins Water Department at (970) 416-2486.

### **The Fort Collins Fluoride Technical Study Group findings**

The FTSG developed consensus findings as follows:

1. Drinking water fluoridation is effective in preventing caries. Over fifty years of accumulated evidence from hundreds of studies shows that optimally fluoridated water reduces caries rates in all age groups. Early studies showed reductions of 50-60% in children. As background caries rates have decreased, relative differences in caries rates between fluoridated and non-fluoridated communities have also decreased. More recent studies estimate differences of about 25%. When communities discontinue fluoridation, caries rates generally increase relative to continuously fluoridated communities.
2. Drinking water fluoridation risks were evaluated:
  - a. The FTSG found that community water fluoridation increases the risk for very mild and mild dental fluorosis. Fluoride ingested from any source during tooth development (infancy to age 8 years) can lead to visibly detectable changes in enamel opacity broadly called dental fluorosis. Very mild or mild forms appear as chalklike lacey markings on the teeth and are not readily apparent even to the affected person. The rare severe form manifests as brittle, pitted and stained enamel. Even the moderate and severe forms are considered cosmetic. The severity depends on the dose, duration and timing of fluoride ingestion. At the concentrations of fluoride provided in Fort Collins water in combination with other sources of fluoride, as many as one in four children under age 8 may develop very mild to mild dental fluorosis. Water fluoridation only accounts for about 40% of dental fluorosis. Other more important risk factors include young children ingesting toothpaste or inappropriately receiving fluoride supplements. With oral health as the goal, increasing the prevalence of mild or very mild dental fluorosis is considered an acceptable adverse effect given the benefits of caries prevention.
  - b. The FTSG found no consistent evidence of other risks at the level of fluoride provided via community drinking water including
    - i. Cancer
    - ii. Bone fractures
    - iii. Skeletal fluorosis (thickened bones and skeletal deformity)
    - iv. Thyroid effects
    - v. Immunological effects
    - vi. Other health effects

Note: The FTSG notes that the absence of finding conclusive evidence of adverse effects does not prove that fluoride cannot cause other potential health effects.

3. Community water fluoridation remains effective and cost saving, even in the current situation of widespread use of fluoride toothpaste and lower baseline caries risk. According to a cost analysis conducted jointly by the FTSG and an economist from the CDC, community water fluoridation is estimated to save between \$3.22 – \$10.31 per capita per year (depending on whether least or most favorable estimates of caries incidence and fluoridation effectiveness were used).
4. There is no credible evidence that the use of hydrofluorosilicic acid (HFS) to fluoridate water introduces additional hazards. The Fort Collins Water Quality Control Laboratory monitors concentrations of heavy metals in the finished water. They do not increase after the addition of HSF. Levels of the naturally occurring elements arsenic and lead are below detection limits (and below the maximum contaminant level) both before and after the water is treated with HFS. HFS completely dissociates in public drinking water supplies to three ions (fluoride, hydrogen and silicate) for which there are ample safety data.

### **Reasons to support continuation of the City's fluoridation program**

1. The weight of evidence of fifty years of study shows that there is a significant reduction in dental decay in populations exposed to fluoridated water at or near the optimal level.
  - Children — The most recent US surveys of schoolchildren show a caries reduction of 25% and an absolute prevalence difference of 1.14 fewer surfaces with caries in primary teeth and a .5 fewer surfaces with caries in permanent teeth with fluoridated water.
  - Adults — Among the four studies of caries prevention in adults, the most recent study showed that community water fluoridation reduced surfaces with caries by .29 surfaces per year of fluoride exposure. These reductions translate into thousands of cavities averted every year that the City of Fort Collins fluoridates its water.
2. The risk associated with water fluoridation is low. There is no conclusive evidence that optimally fluoridated water causes increases in cancer, bone fractures, dental fluorosis exceeding very mild or mild levels, skeletal fluorosis, problems with immunity and thyroid function, or other alleged health effects.
3. Community water fluoridation is cost saving. The community served by City of Fort Collins water saves an estimated \$382,000 per year in averted dental costs alone. Fluoridation is one of the few prevention strategies that actually saves more money than it costs. Routine childhood immunization and influenza immunization in the elderly are among the rare examples of other prevention strategies that are cost-saving.
4. One of the major advantages of water fluoridation over other fluoride modalities is that it does not require behavioral changes from its recipients, and that those most likely to benefit from it will do so. There are many other examples in our society of similar population-based approaches to disease prevention—including folic acid and iron supplementation of cereals and grains (to prevent neural tube defects and iron deficiency anemia, respectively) and vitamin D in milk (to prevent rickets). Were one to apply the argument that no additives should be required in food or water if even a single person could experience an adverse effect, then none of these highly effective prevention strategies could be supported.
5. Fluoridation is particularly beneficial to populations with lower incomes, who have higher caries rates and less access to dental care than their higher income counterparts.
6. There is no evidence of a health risk nor is there any credible pathway that would lead one to posit a risk from the use of hydrofluorosilicic acid or fluorosilicates to fluoridate water. The purity of these products is carefully controlled and they are fully and rapidly dissociated in water before it leaves the plant.
7. Community water fluoridation has been endorsed by the Center for Disease Control and Prevention, the World Health Organization, the American Dental Association, the National Academy of Medicine, and almost one-hundred other national and international governmental agencies, expert bodies and professional associations.

**Reasons to oppose continuation of the City's fluoridation program:**

1. Some argue that with the dramatic decrease in mean caries rates since the early years of fluoridation, it is time to move from a population-wide prevention approach (community water fluoridation) to an individual approach.
  - Although still a cost-saving intervention, the background decrease in caries rates has reduced the net effectiveness of community water fluoridation.
  - There are widely available personal behavior methods to receive fluoride treatments such as toothpastes, gels, mouth washes and dental treatments.
  - Individuals who do not want to consume water with fluoride must undergo personal expense to do so (utilizing filtration systems or purchasing unfluoridated bottled water).
2. Dental fluorosis is increasing.
  - Optimally fluoridated water, in combination with other sources of fluoride can cause dental fluorosis in as many as one in four children under the age of 8, most of it mild or very mild. This is an increase in occurrence from the 1930s and 40s when 12-15% of children under age 8 were found to have dental fluorosis. Although moderate and severe dental fluorosis is extremely rare (and probably not attributable to community water fluoridation), some may find the increase in mild cases unacceptable.
  - Although most cases of dental fluorosis are not of cosmetic concern and therefore don't require treatment, the FTSG cost benefit analysis did not consider the cost of treating it.
3. Some would say that the current level of uncertainty about the affect of lifelong exposure to fluoride on skeletal fluorosis, osteosarcoma and bone fractures, however small, suggests that fluoridation should be suspended until proven completely safe. (This principle is called the precautionary principle.)
4. Both the EPA and the National Toxicology Program have called for further studies of HFS. Using the precautionary principle, some may suggest that fluoridation programs should cease until this happens. [Note: See number four of the FTSG's findings on page two for more about this.]

**Board position:**

The weight of evidence behind water fluoridation for the prevention of dental caries is significant; the potential negative side effects to fluoridation are both minimal and acceptable; fluoridation is the most cost-effective fluoride delivery system for the prevention of dental caries. The Health District Board of Directors strongly supports the City of Fort Collins water fluoridation program due to its significant positive impact on the health of community.

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**About this Analysis**

This analysis was prepared by Health District of Northern Larimer County staff to assist the Health District Board of Directors in determining whether to take an official stand on various health-related issues. Analyses are based on bills or issues at the time of their consideration by the Board and are accurate to the best of staff knowledge. To see whether the Health District Board of Directors took a position on this or other policy issues, please visit [www.healthdistrict.org/policy](http://www.healthdistrict.org/policy).

**About the Health District**

The Health District is a special district of the northern two-thirds of Larimer County, Colorado, supported by local property tax dollars and governed by a publicly elected five-member board. The Health District provides medical, mental health, dental, preventive and health planning services to the communities it serves.

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