



STATE OF TENNESSEE  
**DEPARTMENT OF HEALTH**  
CORDELL HULL BLDG.  
425 5TH AVENUE NORTH  
NASHVILLE TENNESSEE 37243

**PHIL BREDESEN**  
GOVERNOR

**SUSAN R. COOPER, MSN, RN**  
COMMISSIONER

April 3, 2009

The Honorable David Robinson, Mayor  
144 North Second Street  
Selmer, Tennessee 38375

Dear Mayor Robinson:

In a letter to Mr. Kevin Morris, County Director for the McNairy County Health Department, you requested written answers to a list of questions to provide information that the Board of Alderman might consider in its consideration of community water fluoridation. This letter and its attachments are a response to those questions. The responses to the questions are grouped by subject.

Tennessee is proud to be a national leader in community water fluoridation. We have not only met but exceeded the Healthy People 2010 objective of providing fluoridated water to 75 percent of the Tennessee population, and the state is making progress towards achieving all oral health objectives set forth. Today, 93.7 percent of all Tennesseans who drink community-supplied water have access to optimally fluoridated water.

State oral health surveys have demonstrated that over half of the children living in Tennessee ages 5 - 17 are cavity free as compared to those children prior to 1951 (pre fluoridation) who suffered from rampant decay. Comparisons with pre-fluoridation surveys conducted in the early 1950s showed that by 1988 there was a 75% decline in tooth decay in permanent teeth of children as a result of wide spread use of fluoride. The remarkable decline in decay in Tennessee is similar to what has been observed nationally.

Safety and effectiveness of water fluoridation is based on 60 years of scientific study and practical experience. This proven public health measure has resulted in remarkable declines in tooth decay regardless of age, race, sex, socioeconomic status and demographics. Having access to optimally fluoridated water is critical in preventing oral disease in those who have limited access or cannot afford dental care. The benefits of water fluoridation are enjoyed by many Tennesseans, including this at-risk group, but only require minimal efforts to receive.

Hundreds of health professional groups recognize the public health benefits of community water fluoridation to include the American Medical Association, American Water Works Association, American Academy of Family Physicians, American Academy of Pediatrics, and the Institute of Medicine.

The Tennessee Department of Health relies upon credible, authoritative sources for guidance in development of programs and policy. This is true whether the program involves immunizations, AIDS, medical treatment recommendations, or water fluoridation. The Tennessee Department of Health's support of community water fluoridation is based on the overwhelming weight of peer-reviewed, credible scientific evidence reviewed by such agencies as the Centers for Disease Control and Prevention and American Dental Association.

Selmer has been fluoridating its water for more than 35 years. The Tennessee Department of Health recommends that Selmer continue to provide this public health benefit to its citizens.

Warm Regards,

A handwritten signature in black ink that reads "Susan R. Cooper MSN, RN". The signature is written in a cursive style.

Susan R. Cooper, MSN, RN  
Commissioner

cc: Board of Alderman

## Appendix 1

### Daily Intake of fluoride

- Estimates of fluoride intake from studies among U.S. and Canadian adults have ranged from 1-3 mg fluoride per day in fluoridated areas, well below the upper limits of recommended intake (10 mg/day).
- Water and processed beverages can provide approximately 75% of a person's fluoride intake; thus knowing the level of fluoride in drinking water is a key factor in total intake. CDC recommends that all persons know whether the fluoride concentration in their primary source of drinking water is below optimal, optimal, or above optimal. Adults on community water systems can learn of the fluoride level in their water by contacting their water utility or by reading the annual consumer confidence report their water utility is required by the Environmental Protection Agency (EPA) to provide.
- Those with water with natural fluoride above 4 mg/L would be notified of this potential to exceed tolerable limits for fluoride through the consumer report as well as the additional notice EPA requires. Those with home water wells should have their water tested periodically. The Food and Drug Administration requires that bottled water does not contain fluoride at levels that exceeds twice the optimum concentration.
- In response to the questions that focus on the potential fluoride exposure of residents of Selmer, the 2006 National Research Council report on fluoride in drinking water provides comprehensive set of data on water consumption. The rates of water consumption are based on the general U.S. population and are used to estimate the consumption of specific populations. There is no reason or information to indicate that the residents of Selmer would be substantially different in their water consumption than the general U.S. population. Please see Attachments 1, 2, 3, 4, 5, 6, 7, 8, 11, and 13 for data concerning water consumption.
- Regarding dietary sources of fluoride, Attachment 9 and 10 summarize the typical fluoride levels in U.S. Foods. There is no evidence to indicate that the food consumption of Selmer residents would be any different than the general U.S. population. While people have varying levels of fluoride intake based on their water consumption, there is no compelling evidence that optimally fluoridated water is associated with any adverse health effect. One additional tool for concerned individuals wishing to estimate their daily intake is the National Fluoride Database of Selected Beverages and Foods (U.S. Department of Agriculture 2004). This resource lists the fluoride concentration in many common foods and beverages.
- This information is available to all residents of Tennessee including the residents of Selmer from publicly accessible sources.
- The United States Environmental Protection Agency (USEPA) reference dose for fluoride is 0.06 milligrams of fluoride per kilogram of body weight per day. The reference dose as defined by USEPA as an estimate (with uncertainly spanning perhaps an order of magnitude) of a daily exposure to the human population

(including sensitive groups) that is likely to be without an appreciable risk of deleterious effects during a lifetime. For more information:  
<http://www.epa.gov/ncea/iris/subst/0053.htm>

### **National Research Council (NRC)**

- The 2006 National Research Council (NRC) Report on naturally occurring fluoride in drinking water was conducted as part of a routine, periodic review by the Environmental Protection Agency (EPA).
- The NRC report evaluated naturally occurring fluoride levels in drinking water and did not review the public health practice of community water fluoridation.
- *Fluoride in Drinking Water: A Scientific Review of EPA's Standards*, made it clear that the potential for adverse effects from fluoride in drinking water at levels of 2 mg/L to 4 mg/L does not apply at the lower fluoride levels commonly experienced by most U.S. citizens and does not question the use of lower levels of fluoride to prevent tooth decay.
- The NRC report indicated that strong evidence exists that the prevalence of severe enamel fluorosis is nearly zero at water fluoride concentrations below 2 mg/L (page 346), well below the levels used for community water fluoridation in Tennessee.

### **American Dental Association (ADA) Support of Community Water Fluoridation**

- The ADA is a national professional organization that promotes dental research, reviews scientific findings and makes recommendations about dental health based upon those findings.
- The Tennessee Department of Health relies upon credible, authoritative sources for guidance in development of programs and policy.
- The Tennessee Department of Health's support of community water fluoridation is based on the overwhelming weight of peer-reviewed, credible scientific evidence reviewed by such agencies as the Centers for Disease Control and Prevention and American Dental Association.
- See Attachment 12 for the ADA daily fluoride supplemental dose recommendations.

### **Effectiveness**

- The effectiveness of community water fluoridation has been documented by many studies in the U.S. and other countries.
- The U.S. Task Force on Community Preventive Services (a non-Federal entity) strongly recommended community water fluoridation for the prevention and control of dental decay. This was a systematic review using quality studies.

- The effectiveness and safety of fluoride has been documented by other scientific and public health organizations using systematic reviews of the scientific literature and expert panels (National Health and Medical Research Council of Australia, U.S. Public Health Service, National Research Council, World Health Organization, Institute of Medicine, and NHS Centre for Reviews and Dissemination at the University of York, United Kingdom).
- Since the release of the NRC report, the National Health and Medical Research Council of Australia published a scientific systematic review of fluoridation, *A Systematic Review of the Efficacy and Safety of Fluoridation*. The overall conclusions of this review are consistent with previous reviews that affirm the overall safety of water fluoridation.
- The Australian review and many other expert reviews also discuss fluoridation as it relates to potential adverse effects, particularly on tooth enamel. The findings are that most dental fluorosis is mild and not considered to be of ‘aesthetic concern.’
- As to whether fluoride is more effective at preventing cavities in pits and fissures or on smooth surfaces, decay reduction has been observed to be greatest on smooth surfaces, including the enamel smooth surfaces of the crown or the cementum smooth surfaces of the root. The greater effectiveness exhibited by fluoride at reducing decay on smooth surfaces may contribute to the relatively higher proportion of decay observed on pit and fissure surfaces. However, it is important to understand that fluoride also reduces pit and fissure decay. Studies have reported that children consuming optimally fluoridated drinking water experience less pit and fissure decay than children drinking non-fluoridated water, and that children consuming fluoridated water from birth experiencing the greatest benefit, Groeneveld et al (J Dent Res 69(Sp Iss): 751-755. 1990).
- While sealants are highly effective at preventing decay on pit and fissure surfaces, there is evidence that fluoride also reduces cavities on these surfaces. The reduction has been attributed to several possible actions of fluoride, including altering the morphology of pits and fissures, increasing the enamel surface’s resistance to decay, or interfering with microorganisms’ ability to attack the tooth. Dental sealants provide additional protection beyond that due to fluoride for the pits and fissures on teeth, particularly the occlusal surfaces of permanent molars (the surfaces at highest risk of decay). Singh, et al (Caries Res 2007: 41:34-42)
- For further information please go to:  
<http://www.cdc.gov/fluoridation/benefits.htm#2> or  
<http://www.ada.org/public/topics/fluoride/news.asp>

## Safety

- Water safety is defined and determined by federal, state, and local regulations. The main federal law that ensures the quality of Americans' drinking water is the Safe Drinking Water Act (SDWA). Under SDWA, the U.S. Environmental Protection Agency (EPA) sets standards for drinking water quality and oversees the states, localities, and water suppliers who implement those standards. The EPA sets standards for drinking water in accordance with the Safe Drinking

Water Act. It sets the Maximum Contaminant Level (MCL) concentrations allowed for various organisms or substances already in the source water or that are added to water during treatment. This is based on the scientific study of potential adverse health effects that may result from drinking water that contains varying amounts of these organisms or substances.

Optimally fluoridated community water systems add fluoride to a level between 0.7 – 1.2mg/L. Fluoride is sometimes naturally present in water at much higher levels, so the EPA established a Maximum Contaminant Level for fluoride of 4.0 mg/L (parts per million).

- The NSF/ANSI standard 60 limits a chemical or product's contribution of contaminants to drinking water applications. Standard 60 provides for product purity and safety assurance that aim to prevent adding harmful levels of contaminants from chemicals and water treatment additives. Forty-six states, including Tennessee have laws or regulations requiring product compliance with Standard 60. NSF/ANSI standards 60 and 61 were developed by a consortium of associations, including NSF, AWWA, ANSI, the Association of State Drinking Water Administrators, and the Conference of State Health and Environmental Managers. Standards 60 and 61 are accepted by the EPA as the requirements for controlling potential harmful effects from products added to water for its treatment. These standards replaced the former EPA Additives Advisory Program.
- Independent verification organizations, including NSF International and Underwriters Laboratories, verify that fluoride additives comply with the NSF/ANSI standards. These organizations test fluoride additives for regulated metal compounds and other substances that have an EPA MCL. For a fluoride additive product to meet certification standards, regulated metal compounds added by the water treatment process must have a concentration less than 10% of the MCL.
- More on the safety of additives at [http://www.cdc.gov/fluoridation/fact\\_sheets/engineering/wfadditives.htm](http://www.cdc.gov/fluoridation/fact_sheets/engineering/wfadditives.htm)

## **Health effects**

- To date there has been no persuasive evidence that associates community water fluoridation with any adverse health effect. New research and expansion of the science base is always welcome and will be considered when making decisions on water fluoridation. The State of Tennessee bases its practices on the weight of the evidence and the recommendations made by expert panels conducting scientific reviews. The safety and effectiveness of fluoride at levels used in community water fluoridation has been documented by scientific and public health organizations using scientific reviews and expert panels.
- More on scientific review at <http://www.cdc.gov/fluoridation/safety/systematic.htm> or <http://www.ada.org/public/topics/fluoride/index.asp>

## **Infant formula**

- Water fluoridated at a level optimal for oral health poses no known health risks for infants; however, some children may develop enamel fluorosis, a cosmetic condition. When infant formula concentrate is mixed with fluoridated water and used as the primary source of nutrition, it may increase the chances for fluorosis.
- There is no clear evidence that using infant formula from concentrates as the primary source of nutrition increases a child's chances of developing the more severe forms of fluorosis; however, there may be an increased risk for very mild to mild forms.
- Very mild and mild forms may have scattered white flecks, white tips of teeth, or fine, lacy chalklike lines. Most people with fluorosis have these barely noticeable forms.
- Children today are at no greater risk of developing enamel fluorosis from infant formula than children in previous generations. Little has changed with regard to the amount of fluoride consumed or the concentration of fluoride in the formula.
- Water fluoridation is safe, effective, and healthy. Water fluoridated at a level optimal for oral health poses no known health risks for infants. However, some children may develop enamel fluorosis, a cosmetic condition.
- See questions and answers on infant formula at [http://www.cdc.gov/fluoridation/safety/infant\\_formula.htm](http://www.cdc.gov/fluoridation/safety/infant_formula.htm) or <http://www.ada.org>

## **Enamel fluorosis**

- Enamel fluorosis is a hypomineralization of the enamel surface of the tooth that develops during tooth formation. Clinically this appears as a range of cosmetic changes varying from barely noticeable white spots to pitting and staining. Severe forms can occur when young children consume excess fluoride, from any source, during critical periods of tooth development.
- Only children 8 years old and younger are at risk, because this is the time when permanent teeth are developing under the gums.
- Once the teeth erupt (emerge through the gums), they are no longer at risk for fluorosis.
- Adults, adolescents, and children older than 8 years cannot develop enamel fluorosis.
- Dental health professionals seek to minimize this condition, especially moderate to severe forms, consistent with sound caries preventive practices. CDC has provided guidance (MMWR, 2001) to dental and other healthcare providers, public health officials, policymakers, and the public about the use of fluoride to achieve maximum protection against dental caries while reducing the likelihood of enamel fluorosis.

- Excessive fluoride intake when teeth are developing can result in severe forms of fluorosis characterized by tooth discoloration and/or pitting of enamel. There are many sources of fluoride, including fluoride toothpaste, supplements, rinses, and water with high natural concentrations (greater than 2 mg/L) of fluoride that can contribute to total fluoride intake and the possibility of enamel fluorosis.
- Consumption of water at optimal fluoride concentrations, by itself, has not been observed to be associated with fluorosis that results in staining or pitting of tooth surfaces.
- Moderate to severe enamel fluorosis is not associated with community water fluoridation, and the Tennessee Department of Health does not recommend treatment of cases of mild to very mild fluorosis so no treatment costs would be incurred.
- For more information visit:  
[http://www.cdc.gov/fluoridation/safety/enamel\\_fluorosis.htm#1](http://www.cdc.gov/fluoridation/safety/enamel_fluorosis.htm#1)

### **Community water fluoridation and chronic kidney disease**

- Below are two quotes from the April 15, 2008, National Kidney Foundation (NKF) statement concerning fluoride intake in chronic kidney disease (CKD).
  - “Dietary advice for patients with CKD should primarily focus on established recommendations for sodium, potassium, calcium, phosphorus, energy/calorie, protein, fat, and carbohydrate intake. Fluoride intake is a secondary concern.”
  - “The NKF has no position on the optimal fluoridation of water.”
- Findings from Effects of fluoridation of community water supplies for people with chronic kidney disease, Ludlow et al (Nephrol Dial Transplant 22:2763-2767, 2007).
- A thorough review conducted by Kidney Health Australia found no consistent evidence that consumption of optimally fluoridated drinking water poses health risks for people with CKD. Also, the review found no evidence that consumption of optimally fluoridated drinking water increases the risk of developing CKD. More research and more studies are recommended and encouraged in this area.

### **Minority Populations**

- 80% of tooth decay is found in 25% of the children and is concentrated in minority populations. Community water fluoridation helps level the playing field for these children providing a health benefit regardless of age, race, socioeconomic status and gender.

### **Removal of fluoride from water**



- The cost for a reverse osmosis system ranges in price from about \$160 to \$500 depending upon manufacturer and size of the system.

Attachment 1.

Table 2-2 from NRC Report: “Fluoride in Drinking Water: A Scientific Review of EPA’s Standards.”

TABLE 2-2 Examples of Fluoride Intake from Consumption of Community (Municipal) Water by People Living in Fluoridated Areas<sup>a</sup>

	Typical Consumers				High Consumers			
	Water Consumption		Fluoride Intake <sup>c</sup>		Water Consumption		Fluoride Intake <sup>c</sup>	
	mL/day	mL/kg/day	mg/day	mg/kg/day	mL/day	mL/kg/day	mg/day	mg/kg/day
U.S. population (total)	1,000	17	0.7-1.2	0.012-0.020	2,100	33	1.5-2.5	0.023-0.040
All infants (<1 year) <sup>e</sup>	500	60	0.35-0.6	0.042-0.072	950	120	0.67-1.1	0.084-0.14
Children 1-2 years	350	26	0.25-0.42	0.018-0.031	700	53	0.49-0.84	0.037-0.064
Children 3-5 years	450	23	0.32-0.54	0.016-0.028	940	45	0.66-1.1	0.032-0.054
Children 6-12 years	500	16	0.35-0.6	0.011-0.019	1,000	33	0.7-1.2	0.023-0.040
Youths 13-19 years	800	12	0.56-0.96	0.0084-0.014	1,700	26	1.2-2.0	0.018-0.031
Adults 20-49 years	1,100	16	0.77-1.3	0.011-0.019	2,200	32	1.5-2.6	0.022-0.038
Adults 50+ years	1,200	17	0.84-1.4	0.012-0.020	2,300	32	1.6-2.8	0.022-0.038
Females 13-49 years/ <sup>f</sup>	980	15	0.69-1.2	0.011-0.018	2,050	32	1.4-2.5	0.022-0.038

<sup>a</sup>Based on consumption data described in Appendix B for people actually consuming community (municipal) water.

<sup>b</sup>Based on a typical consumption rate of community (municipal) water for the age group. <sup>c</sup>Based on a reasonably high (but not upper bound) consumption rate of community (municipal) water for the age group; some individual exposures could be higher. <sup>d</sup>Based on fluoride concentrations of 0.7-1.2 mg/L. <sup>e</sup>Includes any infant, nursing or nonnursing, who consumes at least some community water; these infants may be fed primarily breast milk, ready-to-feed formula (to which no water is normally added), or formula prepared from concentrate (which requires addition of water). <sup>f</sup>Women of childbearing age.

Attachment 2.

Table 2-4 from NRC Report: “Fluoride in Drinking Water. A Scientific Review of EPA’s Standards

Table 2-4 Examples of Fluoride Intake from Drinking Water by Members of Selected Population Subgroups Living in Fluoridated Areas<sup>a</sup>

Population Subgroup (Weight)	Typical Consumers				High Consumers			
	Water Consumption		Fluoride Intake <sup>a</sup>		Water Consumption		Fluoride Intake <sup>a</sup>	
	mL/day	mL/kg/day	mg/day	mg/kg/day	mL/day	mg/kg/day	mg/day	mg/kg/day
Athletes, workers, military (50 kg)	2,500	50	1.8-3.0	0.035-0.06	3,500	70	2.5-4.2	0.049-0.08
Athletes, workers, military (70 kg)	3,500	50	2.5-4.2	0.035-0.06	4,900	70	3.4-5.9	0.049-0.08
Athletes, workers, military (100 kg)	5,000	50	3.5-6.0	0.035-0.06	7,000	70	4.9-8.4	0.049-0.08
Athletes and workers (120 kg)	6,000	50	4.2-7.2	0.035-0.06	8,400	70	5.9-10	0.049-0.08
DM patients (20 kg)	1,000	50	0.7-1.2	0.035-0.06	2,000	100	1.4-2.4	0.07-0.11
DM patients (70 kg)	3,500	50	2.5-4.2	0.035-0.06	4,900	70	3.4-5.9	0.049-0.08
NDI patients (20 kg)	1,000	50	0.7-1.2	0.035-0.06	3,000	150	2.1-3.6	0.11-0.18
NDI patients (70 kg)	3,500	50	2.5-4.2	0.035-0.06	10,500	150	7.4-13	0.11-0.18

<sup>a</sup> Assumes all drinking water is from fluoridated community (municipal) sources. <sup>b</sup> Based on a typical consumption rate for the population subgroup. <sup>c</sup> Based on a reasonably high (but not upper bound) consumption rate for the population subgroup; some individual exposures could be higher. <sup>d</sup> Based on fluoride concentrations of 0.7-1.2 mg/L.

ABBREVIATIONS: DM, diabetes mellitus; NDI, nephrogenic diabetes insipidus.

Attachment 3.

Table B-4 from NRC Report: "Fluoride in Drinking Water. A Scientific Review of EPA's Standards."

TABLE B-4 Estimated Average Daily Water Ingestion (mL/day) from Community Sources During 1994-1996, by People Who Consume Water from Community Sources

Population	Mean	50th Percentile	90th Percentile	95th Percentile	99th Percentile	Sample Size	Population
All consumers	1,000	785	2,069	2,600	4,273	14,012	242,641,675
<0.5 year	529	543	943	1,064	1,366	111	1,062,136
0.5-0.9 year	502	465	950	1,122	1,529	135	1,449,698
1-3 years	351	267	719	952	1,387	1,625	10,934,001
4-6 years	454	363	940	1,213	1,985	1,110	11,586,632
7-10 years	485	377	995	1,241	1,999	884	14,347,058
11-14 years	641	473	1,415	1,742	2,564	759	14,437,898
15-19 years	817	603	1,669	2,159	3,863	777	16,735,467
20-24 years	1,033	711	2,175	3,082	5,356	644	17,658,027
25-54 years	1,171	965	2,326	2,926	4,735	4,599	106,779,569
55-64 years	1,242	1,111	2,297	2,721	4,222	1,410	19,484,112
≥65 years	1,242	1,149	2,190	2,604	3,668	1,958	28,167,077
Males (all)	1,052	814	2,164	2,733	4,616	7,082	118,665,763
<1 year	462	441	881	1,121	1,281	118	1,191,526
1-10 years	444	355	934	1,155	1,731	1,812	18,847,070
11-19 years	828	595	1,673	2,058	3,984	768	15,923,625
≥ 20 years	1,242	1,038	2,387	3,016	4,939	4,384	82,703,542
Females (all)	951	747	2,005	2,482	3,863	6,930	123,975,912
<1 year	560	542	967	1,122	1,584	128	1,320,308
1-10 years	426	329	940	1,109	2,014	1,807	18,020,621
11-19 years	638	457	1,382	1,774	2,598	768	15,249,740
≥ 20 years	1,116	943	2,165	2,711	4,268	4,227	89,385,243
Lactating women	1,665	1,646	2,959	3,588	4,098	34	971,057
Pregnant women	872	553	1,844	2,588	3,448	65	1,645,565
Women aged 15-44 years	984	756	2,044	2,722	4,397	2,176	55,251,477

Source: EPA 2000a.

Attachment 4.

Table B-5 from NRC Report: "Fluoride in Drinking Water. A Scientific Review of EPA's Standards."

TABLE B-5 Estimated Average Daily Water Ingestion (mL/day) from Bottled Water During 1994-1996, by People Who Consume Bottled Water

Population	Mean	50 <sup>th</sup> Percentile	90 <sup>th</sup> Percentile	95 <sup>th</sup> Percentile	99 <sup>th</sup> Percentile	Sample Size	Populatio
All consumers	737	532	1,568	1,967	3,316	3,078	57,316,80
<0.5 year	411	349	896	951	1,193	51	538,267
0.5-0.9 year	437	361	802	808	1,578	37	456,103
1-3 years	302	232	649	819	1,175	368	2,532,20
4-6 years	390	315	794	922	1,319	213	2,336,873
7-10 years	416	323	828	985	1,767	164	2,808,75
11-14 years	538	361	1,099	1,420	2,192	148	2,896,89
15-19 years	665	468	1,503	1,777	3,149	163	3,528,43
20-24 years	786	532	1,640	2,343	3,126	179	5,089,21
25-54 years	822	621	1,773	1,981	3,786	1,174	28,487,35
55-64 years	860	685	1,833	2,306	2,839	79	3,987,57
≥65 years	910	785	1,766	2,074	2,548	302	4,655,13
Males (all)	749	533	1,626	2,097	3,781	1,505	26,298,39
<1 year	414	317	805	1,012	1,397	48	575,019
1-10 years	365	266	767	847	1,685	376	3,755,22
11-19 years	682	464	1,423	1,822	2,802	144	2,969,95
≥20 years	845	592	1,774	2,303	3,855	937	18,998,20
Females (all)	727	532	1,542	1,893	3,031	1,573	31,018,41
<1 year	436	428	895	896	1,301	40	419,351
1-10 years	375	289	765	993	1,347	369	3,922,61
11-19 years	544	357	1,116	1,537	3,143	167	3,455,37
20 years	819	690	1,747	1,975	3,060	997	23,221,07
Lactating women	749	608	1,144	1,223	1,286	7	278,308
Pregnant women	891	683	1,910	1,957	2,198	27	698,645
Women aged 15-44 years	766	592	1,598	1,922	3,093	611	16,279,43

Source: EPA 2000a.

Attachment 5.

Table B-6 from NRC Report: "Fluoride in Drinking Water. A Scientific Review of EPA's Standards."

TABLE B-6 Estimated Average Daily Water Ingestion (mL/day) from Other Sources (e.g., Wells and Cisterns) During 1994-1996, by People Who Consume Water from Those Sources.

Population	Mean	50 <sup>th</sup> Percentile	90 <sup>th</sup> Percentile	95 <sup>th</sup> Percentile	99 <sup>th</sup> Percentile	Sample Size	Population
All consumers	965	739	1,971	2,475	3,820	2,129	34,693,744
<0.5 year	306	188	637	754	878	15	117,444
0.5-0.9 year	265	172	552	560	567	14	198,639
1-3 years	347	291	710	761	1,190	206	1,243,498
4-6 years	390	285	778	1,057	1,332	137	1,382,002
7-10 years	485	399	992	1,093	1,623	134	2,121,832
11-14 years	733	553	1,561	1,884	3,086	121	2,243,452
15-19 years	587	395	1,221	1,721	2,409	109	2,372,842
20-24 years	640	472	1,305	1,648	1,937	67	1,809,825
25-54 years	1,124	917	2,175	2,834	4,728	731	15,480,754
55-64 years	1,276	1,111	2,365	2,916	5,152	272	3,504,576
≥65 years	1,259	1,181	2,136	2,470	3,707	323	4,218,880
Males (all)	1,031	785	2,107	2,821	4,734	1,155	17,880,530
<1 year	243	148	554	567	773	16	198,829
1-10 years	426	320	884	1,077	1,630	259	2,566,652
11-19 years	702	564	1,366	1,753	2,787	103	2,011,715
≥20 years	1,212	1,001	2,286	3,017	4,883	777	13,103,334
Females (all)	894	710	1,826	2,225	3,035	974	16,813,214
<1 year	344	256	537	579	759	13	117,254
1-10 years	416	352	865	1,039	1,165	218	2,180,680
11-19 years	624	406	1,394	1,873	2,489	127	2,604,579
≥20 years	1,046	941	1,925	2,371	3,123	616	11,910,701
Lactating women	1,248	915	2,148	2,410	2,620	7	182,414
Pregnant women	1,066	660	1,676	1,807	3,374	7	168,433
Women aged 15-44 years	904	666	1,863	2,319	3,056	283	6,759,992

Source: EPA 2000a.

Attachment 6.

Table B-7 from NRC Report: "Fluoride in Drinking Water. A Scientific Review of EPA's Standards."

TABLE B-6 Estimated Average Daily Water Ingestion (mL/day) from Other Sources (e.g., Wells and Cisterns) During 1994-1996, by People Who Consume Water from Those Sources.

Population	Mean	50 <sup>th</sup> Percentile	90 <sup>th</sup> Percentile	95 <sup>th</sup> Percentile	99 <sup>th</sup> Percentile	Sample Size	Population
All consumers	965	739	1,971	2,475	3,820	2,129	34,693,744
<0.5 year	306	188	637	754	878	15	117,444
0.5-0.9 year	265	172	552	560	567	14	198,639
1-3 years	347	291	710	761	1,190	206	1,243,498
4-6 years	390	285	778	1,057	1,332	137	1,382,002
7-10 years	485	399	992	1,093	1,623	134	2,121,832
11-14 years	733	553	1,561	1,884	3,086	121	2,243,452
15-19 years	587	395	1,221	1,721	2,409	109	2,372,842
20-24 years	640	472	1,305	1,648	1,937	67	1,809,825
25-54 years	1,124	917	2,175	2,834	4,728	731	15,480,754
55-64 years	1,276	1,11	2,365	2,916	5,152	272	3,504,576
≥65 years	1,259	1,18	2,136	2,470	3,707	323	4,218,880
Males (all)	1,031	785	2,107	2,821	4,734	1,155	17,880,530
<1 year	243	148	554	567	773	16	198,829
1-10 years	426	320	884	1,077	1,630	259	2,566,652
11-19 years	702	564	1,366	1,753	2,787	103	2,011,715
≥20 years	1,212	1,00	2,286	3,017	4,883	777	13,103,334
Females (all)	894	710	1,826	2,225	3,035	974	16,813,214
<1 year	344	256	537	579	759	13	117,254
1-10 years	416	352	865	1,039	1,165	218	2,180,680
11-19 years	624	406	1,394	1,873	2,489	127	2,604,579
≥20 years	1,046	941	1,925	2,371	3,123	616	11,910,701
Lactating women	1,248	915	2,148	2,410	2,620	7	182,414
Pregnant women	1,066	660	1,676	1,807	3,374	7	168,433
Women aged 15-44 years	904	666	1,863	2,319	3,056	283	6,759,992

Source: EPA 2000a.

Attachment 7.

Table B-8 from NRC Report: "Fluoride in Drinking Water. A Scientific Review of EPA's Standards.

TABLE B-7 Estimated Average Daily Water Ingestion (ml/day) from All Sources During 1994-1996 by Consumers of Water

Population	Mean	50th Percentile	90th Percentile	95th Percentile	99th Percentile	Sample Size	Population
All consumers <0.5 year 0.5-0.9 year	1,241 544 580	1,045 554 6,53	2,345 947 1,130	2,922 1,078 1,273	4,808 1,365 1,672	15,172 156 154	259,972,235 1,507,727 1,732,993
1-3 years 4-6 years	422 548	351 468	807 1,019	993 1,268	1,393 2,031	1,814 1,193	12,143,483 12,438,322
7-10 years	608	514	1,131	1,425	2,172	937	15,248,676
11-14 years	815	651	1,625	1,962	3,033	812	15,504,627
15-19 years	1,006	77	1,897	2,414	4,027	814	17,697,092
20-24 years 25-54 years	1,283 1,486	1,013 1,273	2,508 2,638	3,632 3,337	5,801 5,259	678 4,906	18,544,787 113,011,204
55-64 years	1,532	1,378	2,557	2,999	4,395	1,541	21,145,387
≥65 years	1,453	1,345	2,324	2,708	3,750	2,167	30,997,937
Males (all)	1,300	1,070	2,483	3,149	5,212	7,689	126,998,276
<1 year	549	538	1,121	1,278	1,567	151	1,560,310
1-10 years	536	451	1,024	1,254	1,817	1,993	20,495,833
11-19 years	1,001	761	1,898	2,434	4,011	809	16,887,932
≥20 years	1,549	1,331	2,740	3,524	5,526	4,736	88,054,201
Females (all)	1,185	1,021	2,221	2,703	4,252	7,483	132,973,959
<1 year	577	559	950	1,131	1,654	159	1,680,410
1-10 years	528	445	993	1,226	2,035	1,951	19,334,648
11-19 years	830	664	1,652	1,955	3,083	817	16,313,787
≥20 years	1,389	1,221	2,416	2,928	4,512	4,556	95,645,114
Lactating women	1,806	1,498	3,021	3,767	4,024	41	1,171,868
Pregnant women	1,318	1,228	2,339	2,674	3,557	70	1,751,888
Women aged 15-44 years	1,265	1,065	2,366	2,952	4,821	2,314	58,549,659

Source: EPA 2000a.



Attachment 8.

Table B-9 from NRC Report: "Fluoride in Drinking Water. A Scientific Review of EPA's Standards."

Table B-9 Estimated Average Daily water Ingestion (mL/kg of Body Weight per Day) from All Sources During 1994-1996 by Consumers of Water

Population	Mean	50th Percentile	90th Percentile	95th Percentile	99th Percentile	Sample Size	Population
All consumers	17	13	33	44	79	13,593	236,742,834
<0.5 year	88	85	169	204	240	106	1,034,566
0.5-0.9 year	56	52	116	127	170	128	1,405,128
1-3 years	26	20	53	68	112	1,548	10,417,368
4-6 years	23	18	45	65	95	1,025	10,751,616
7-10 years	16	12	33	39	60	820	13,427,986
11-14 years	13	10	27	36	54	736	14,102,256
15-19 years	12	9	26	32	62	771	16,646,551
20-24 years	15	11	31	39	80	637	17,426,127
25-54 years	16	13	32	40	65	4,512	104,816,948
55-64 years	17	14	32	38	58	1,383	19,011,778
≥65 years	18	16	32	37	53	1,927	27,702,510
Males (all)	16	13	32	43	81	6,935	117,076,195
<1 year	66	60	139	175	235	115	1,180,289
1-10 years	21	16	43	55	87	1,705	17,865,064
11-19 years	14	10	27	38	67	755	15,717,364
≥20 years	15	13	30	38	62	4,360	82,313,478
Females (all)	17	14	35	45	77	6,658	119,666,639
<1 year	72	69	139	169	203	119	1,259,405
1-10 years	21	17	45	61	98	1,688	16,731,906
11-19 years	12	9	26	32	48	752	15,031,443
≥20 years	17	14	33	41	63	4,099	86,643,885
Lactating women	26	20	54	55	57	33	940,375
Pregnant women	14	9	33	43	47	65	1,645,565
Women aged 15-44 years	15	12	32	39	66	2,126	54,000,618

Source: EPA 2000a

Attachment 9.

Table 2-6 from NRC Report: "Fluoride in Drinking Water. A Scientific Review of EPA's Standards."

TABLE 2-6 Summary of Typical Fluoride Concentrations of Selected Food and Beverages in the United States

Source	Range	Range, mg/kg
Human breast milk Fluoridated area (1 mg/L)	0.007-0.01	—
Nonfluoridated area	0.004	---
Cow's Milk	≤0.07	---
Soy Milk	0.5	---
Milk-based infant formula*	≤0.2	---
Soy-based infant formula*	0.2 - 0.3	---
Infant food - Chicken	---	1-8
Infant food - other	---	0.01 - 0.7
Tea*	0.3 - 5	---
Herbal tea*	0.02 - 0.15	---
Coffee*	0.1 - 0.6	---
Grape Juice*	<3	---
Other juices and juice drinks*	≤1.5	---
Grapes	----	0.8-5
Carbonated beverages	0.02 - 1.3	---
Wine	0.2 - 3	---
Beer	0.08 - 1	---

\*Not including contribution from local tap water.

Attachment 10.

Table 8-2 from IOM Report: "Dietary Reference Intakes for Calcium, Phosphorus, Magnesium, Vitamin D, and Fluoride."

TABLE 8-2 Fluoride Concentrations of Foods

Food	Fluoride Concentration (mg/liter or kg)	
	Average	Range
Fruits	0.06	0.02-0.08
Meat, fish, poultry	0.22	0.04-0.51
Oils and fats	0.25	0.02-0.44
Dairy products	0.25	0.02-0.82
Leafy vegetables	0.27	0.08-0.70
Sugar and adjunct substances	0.28	0.02-0.78
Root vegetables	0.38	0.27-0.48
Grain and cereal products	0.42	0.08-2.01
Potatoes	0.49	0.21-0.84
Legume vegetables	0.53	0.49-0.57
Nonclassifiable	0.59	0.29-0.87
Beverages	0.76	0.02-2.74

Source: Tayes, 1983.

Attachment 11.

Table 2-13 from NRC Report: "Fluoride in Drinking Water. A Scientific Review of EPA's Standards."

Measures of Exposure to Fluoride in the United States

TABLE 2-13 Contributions to Total Fluoride Chronic Exposure at 1 mg/L in Drinking Water

% Contribution to Total Exposure Total		
Exposure, Pesticides Background Population Subgroups mg/kg/day and Air Food	Tooth -	Drinking Water
Modeled average water consumer (Tap water at 1 mg/L, nontap water at 0.5 mg/L; Table 2-11)		
All infants (<1 year) 0.070 4.7 13.6	0	81.7
Nursing 0.030 8.9 15.6	0	70.8
Nonnursing 0.087 4.3 13.2	0	82.5
Children 1-2 years 0.066 9.7 31.7	17.4	41.3
Children 3-5 years 0.060 7.4 30.4	19.1	43.1
Children 6-12 years 0.040 5.4 30.9	18.9	44.8
Youth 13-19 years 0.028 4.9 34.8	12.0	48.3
Adults 20-49 years 0.031 4.0 36.3	4.6	55.1
Adults 50+ years 0.031 4.4 32.4	4.6	58.7
Females 13-49 years <sup>a</sup> 0.031 4.4 34.7	5.3	55.6
EPA default water intake, all water at 1 mg/L		
(1 L/day for 10-kg child; 2 L/day for 70-kg adult; Table 2-12)		
All infants (<1 year) 0.113 2.9 8.5	0	88.6
Nursing 0.109 2.4 4.3	0	92.0
Nonnursing 0.115 3.2 9.9	0	86.9
Children 1-2 years 0.139 4.6 15.1	8.3	72.0
Adults 20-49 years 0.043 3.0 26.7	3.3	67.0
High end of high water intake individuals all water at 1 mg/L (based on intake rates in Table 2-4)		
Athletes and workers 0.084 1.5 13.5	1.7	83.3
DM patients (3-5 years) 0.134 3.3 13.5	8.5	74.7
DM patients (adults) 0.084 1.5 13.5	1.7	83.3
NDI patients (3-5 years) 0.184 2.4 9.9	6.2	81.6
NDI patients (adults) 0.164 0.8 6.9	0.9	91.4

<sup>a</sup> Women of childbearing age.

ABBREVIATIONS: DM, diabetes mellitus, NDI, nephrogenic diabetes.

Attachment 12.

Fluoride Supplement Dosage Schedule- 1994.

Approved by the American Dental Association, American Academy of Pediatrics and American Academy of Pediatric Dentistry

Age	Fluoride Ion Level in Drinking Water (ppm)*		
	<0.3 ppm	0.3 - 0.6 ppm	>0.6 ppm
Birth-6 months	None	None	None
6 months-3 years	0.25 mg/day**	None	None
3-6 years	0.50 mg/day**	0.25 mg/day**	None
6-16 years	1.0 mg/day**	0.50 mg/day**	None
* 1.0 ppm = 1 mg/liter ** fluoride ion			

Source: [http://ada.org/public/topics/fluoride/fluoride\\_article01.asp#dosage](http://ada.org/public/topics/fluoride/fluoride_article01.asp#dosage)

Attachment 13.

Table B-11 from NRC Report: "Fluoride in Drinking Water. A Scientific Review of EPA's Standards."

Table B-11. Estimated Intake of Fluoride from Community Water for Average Consumers

Population	Water Intake, mL/day	Fluoride Level				
		0.7 mg/L	1 mg/L	1.2 mg/L	2 mg/L	4 mg/L
		Intake, mg/day				
All consumers	1,000	0.70	1.00	1.20	2.00	4.00
<0.5 year	529	0.37	0.53	0.63	1.06	2.12
0.5-0.9 year	502	0.35	0.50	0.60	1.00	2.01
1-3 years	351	0.25	0.35	0.42	0.70	1.40
4-6 years	454	0.32	0.45	0.54	0.91	1.82
7-10 years	485	0.34	0.49	0.58	0.97	1.94
11-14 years	641	0.45	0.64	0.77	1.28	2.56
15-19 years	817	0.57	0.82	0.98	1.63	3.27
20-24 years	1,033	0.72	1.03	1.24	2.07	4.13
25-54 years	1,171	0.82	1.17	1.41	2.34	4.68
55-64 years	1,242	0.87	1.24	1.49	2.48	4.97
≥ 65 years	1,242	0.87	1.24	1.49	2.48	4.97
	Water Intake, mL/kg/day	Intake, mg per kg body weight/day				
All consumers	17	0.012	0.017	0.020	0.034	0.068
<0.5 year	88	0.062	0.088	0.106	0.176	0.352
0.5-0.9 year	56	0.039	0.056	0.067	0.112	0.224
1-3 years	26	0.018	0.026	0.031	0.052	0.104
4-6 years	23	0.016	0.023	0.028	0.046	0.092
7-10 years	16	0.011	0.016	0.019	0.032	0.064
11-14 years	13	0.009	0.013	0.016	0.026	0.052
15-19 years	12	0.008	0.012	0.014	0.024	0.048
20-24 years	15	0.011	0.015	0.018	0.030	0.060
25-54 years	16	0.011	0.016	0.019	0.032	0.064
55-64 years	17	0.012	0.017	0.020	0.034	0.068
≥ 65 years	18	0.013	0.018	0.022	0.036	0.072

Based on water consumption rates estimated by EPA (2000a).