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June 14, 2006

BY FEDERAL EXPRESS

Division of Nutrition Programs and Labeling
Office of Nutritional Products, Labeling
and Dietary Supplements (HFS-800)
Center for Food Safety and Applied Nutrition
Food and Drug Administration
Harvey W. Wiley Federal Building
5100 Paint Branch Parkway
College Park, MD 20740-3835

Re: Notification for a Health Claim Based on an Authoritative Statement: Drinking Fluoridated Water Reduces the Risk of Dental Caries (Tooth Decay)

Dear Sir/Madam:

Enclosed for submission please find two copies of the Notification for a Health Claim Based on an Authoritative Statement: Drinking Fluoridated Water Reduces the Risk of Dental Caries (Tooth Decay).

Respectfully submitted,

Sarah Taylor Roller

Sarah Taylor Roller, JD, RD, MPH

Enclosures

2006Q-0418

HCN 1

COVINGTON & BURLING

NOTIFICATION FOR A HEALTH CLAIM BASED ON AN AUTHORITATIVE STATEMENT:

DRINKING FLUORIDATED WATER REDUCES THE RISK OF DENTAL CARIES (TOOTH DECAY)

June 14, 2006

Submitted to: Division of Nutrition Programs and Labeling
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I. Introduction

Fluoridation of drinking water has been hailed by the Centers for Disease Control and Prevention ("CDC") as one of the ten greatest public health achievements of the twentieth century.[1] Extensive studies over more than sixty years have established that individuals whose drinking water is fluoridated show a reduction in dental caries (tooth decay).[2] The safety and effectiveness of appropriately fluoridated drinking water in preventing dental caries are so thoroughly documented that community water fluoridation has been widely adopted as a major public health strategy in the United States and abroad. Nearly one hundred national and international organizations have recognized the public health benefits of community water fluoridation for preventing dental caries,[3] and increased fluoridation of community drinking water remains a major public health goal in the United States.[4] Even while other sources of fluoride, such as fluoridated toothpastes and mouthwashes, have been introduced since the discovery of the role of fluoride in preventing dental caries, fluoridated drinking water retains a central role in preventing caries.[5]

The relationship between fluoridated water and reduced risk of dental caries is so conclusively established that it has been expressed in four separate authoritative statements by scientific bodies of the U.S. government with official responsibility for public health protection, as documented in this Notification. Moreover, FDA itself has already acknowledged the

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[1] CDC. Ten Great Public Health Achievements – United States, 1900-1999. MMWR. 1999;48(No. RR-12):241-3; CDC. Achievements in Public Health, 1900-1999: Fluoridation of drinking water to prevent dental caries. MMWR.1999;48:933-40.

[2] Public Health Service Committee to Coordinate Environmental Health and Related Programs. Review of Fluoride: Benefits and Risk, Washington, DC: U.S. Depart. of Health and Human Services, Public Health Service, 1991 ("PHS Review of Fluoride") (relevant portions attached as Attachment 1), at 87.

[3] *See* Position of the American Dietetic Association: The Impact of Fluoride on Health. J Am Diet Assoc. 2005;105:1620-1628, at 1621, and citations therein.

[4] For example, one of the objectives of "Healthy People 2010" is to increase the proportion of the U.S. population served by community water systems with optimally fluoridated water. U.S. Dept. of Health and Human Services. Healthy People 2010. Vols. I and II, 2d ed. Washington, DC: U.S. Government Printing Office, 2000 ("Healthy People 2010"), at 21-28.

[5] *See, e.g.*, Institute of Medicine. Dietary Reference Intakes for Calcium, Phosphorous, Magnesium, Vitamin D, and Fluoride. Washington, DC: National Academy Press, 1997 at ("IOM DRI Report") (relevant portions attached as Attachment 2), at 298 ("water fluoridation continues to be of major importance in the control of dental caries"); PHS Review of Fluoride, at 87 ("Although the comparative degree of measurable benefit has been reduced recently as other fluoride sources have become available in non-fluoridated areas, the benefits of water fluoridation are still clearly evident.").

established relationship between fluoridated drinking water and prevention of dental caries, notably, in its rulemaking on bottled water standards.[6]

Given the well established benefit of fluoridated drinking water in the prevention of dental caries, public and dental health officials and organizations have expressed serious concern that the rapidly and substantially growing trend toward consumption of bottled water could lead to an increase in the incidence of caries.[7] As FDA has acknowledged based on beverage sales trends, bottled water is among the most popular beverage choices of U.S. consumers.[8] Unfortunately, few bottled waters contain levels of fluoride sufficient to provide protection against dental caries.[9] Consumers substituting such bottled waters for fluoridated tap water could lose the significant dental health benefits that have been provided by sufficiently fluoridated water for more than half a century.[10]

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[6] 60 Fed. Reg. 57076, 57079 (November 13, 1995) (bottled water standards final rule) ("The agency recognizes that water with fluoride added may provide a benefit to consumers. The Surgeon General's Report on Nutrition and Health (the Surgeon General's Report) recommends that community water systems contain fluoride at optimal levels for prevention of tooth decay and that, if such water is not available, other appropriate sources of fluoride should be used. Bottled water may be used by some consumers as an alternative to community drinking water."); 53 Fed. Reg. 36063, 36065 (September 16, 1988) (proposed rule to amend quality standard for fluoride in bottled drinking water) ("the optimum level [of fluoride in bottled water] affords high protection against dental caries while minimizing the presence of observable dental fluorosis.").

[7] *See, e.g.,* U.S. Dept. of Health and Human Services, U.S. Dept. of Agriculture. Dietary Guidelines for Americans, 2005. 6th ed. Washington, DC:US Government Printing Office. January 2005 ("Dietary Guidelines"), at 37 ("Most bottled water is not fluoridated. With the increase in consumption of bottled water, there is concern that Americans may not be getting enough fluoride for maintenance of oral health."); American Dental Association ("ADA"). Fluoridation Facts. Chicago: ADA, 2005 ("ADA Fluoridation Facts") (Attachment 3), at 19-20 (citing the rapidly growing consumption of bottled water and advising that "[i]ndividuals who drink bottled water as their primary source of water could be missing the decay preventive effects of optimally fluoridated water available from their community water supply.").

[8] Posnick LM, Henry K. Ask the Regulators: Bottled Water Regulation and the FDA. Food Safety Magazine, August/September 2002, available at http://www.cfsan.fda.gov/~dms/botwatr.html.

[9] *See, e.g.,* CDC, Recommendations for Using Fluoride to Prevent and Control Dental Caries in the United States. MMWR 2001;50 (No. RR-14):1-42 ("CDC Recommendations for Fluoride Use") (Attachment 4), at 12 ("Although some bottled waters marketed in the United States contain an optimal concentration of fluoride (approximately 1.0 ppm), most contain <0.3 ppm fluoride"), and studies cited therein.

[10] *See, e.g.,* CDC Recommendations for Fluoride Use, at 12-13 ("Thus, a person substituting bottled water with a low fluoride concentration for fluoridated community water might not receive the full benefits of community water fluoridation."); ADA Fluoridation Facts, *supra* note 7.

The instant FDAMA health claim would help educate consumers about the role and importance of fluoridated water in the diet and help foster consumer choices among bottled water products that are supportive of dental health. Pursuant to section 403(r)(3)(C) of the Federal Food, Drug, and Cosmetic Act ("FDCA"), 21 U.S.C. § 343(r)(3)(C), the Food and Drug Administration ("FDA") is hereby notified that the health claim, "Drinking fluoridated water reduces the risk of [dental caries or tooth decay]," is authorized for use on bottled water products based on authoritative statements made in the following publications by scientific bodies of the United States Government with official responsibility for public health protection or research directly relating to human nutrition:

- Food and Nutrition Board, Institute of Medicine, "Dietary Reference Intakes for Calcium, Phosphorus, Magnesium, Vitamin D, and Fluoride" ("IOM DRI Report")[11]

- "Oral Health in America: A Report of the Surgeon General" ("Surgeon General Report")[12]

- Centers for Disease Control and Prevention, "Recommendations for Using Fluoride to Prevent and Control Dental Caries in the United States" ("CDC Recommendations for Fluoride Use ")[13]

- Public Health Service, "Review of Fluoride: Benefits and Risk" ("PHS Review of Fluoride")[14]

Products eligible to bear the health claim are bottled water meeting the standards of identity and quality set forth at 21 C.F.R. § 165.110, and containing more than 0.6 mg/L and up to 1.0 mg/L fluoride. These bottled water products must also bear labeling as specified in Section VI.D. of this Notification.

The proposed health claim regarding the relationship between fluoridated water and prevention of dental caries (tooth decay) is precisely the kind of claim for which Congress's amendments to the FDCA health claim provisions were intended to provide. As discussed more fully in section III, below, Congress amended those provisions as part of the Food and Drug Administration Modernization Act of 1997 ("FDAMA") to allow for health and nutrient content claims based upon authoritative statements of certain scientific bodies of the United States government, so that information about well-accepted relationships between nutrients and disease could be effectively and efficiently disseminated to consumers in product labeling without

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[11] IOM DRI Report, *supra* note 5.

[12] U.S. Dept. of Health and Human Services. Oral Health in America: A Report of the Surgeon General. Rockville, MD: U.S. Dept. of Health and Human Services, National Institute of Dental and Craniofacial Research, National Institutes of Health, 2000 ("Surgeon General Report") (relevant portions attached as Attachment 5).

[13] CDC Recommendations for Fluoride Use, *supra* note 9.

[14] PHS Review of Fluoride, *supra* note 2.

requiring FDA to engage in redundant review of the scientific evidence that often delays the process unnecessarily.

II. Background on Fluoride and Dental Health

A. Description and Prevalence of Dental Caries (Tooth Decay)

Dental caries, also known as tooth decay, is an infectious, transmissible disease in which bacterial by-products (acids) dissolve the hard surfaces of teeth. If left unchecked, the bacteria can penetrate the dissolved surface, attack the underlying dentin, and reach the soft pulp tissue. Dental caries can result in loss of tooth structure, pain, and tooth loss, and can ultimately progress to acute systemic infection.[15] Dental caries commonly afflict people in industrialized countries and lesser developed countries.[16] The CDC explains that risk for dental caries exists on a continuum, with each person at risk to some extent, and that caries risk can vary over time – perhaps numerous times during a person's lifetime – as risk factors change.[17] Eighty-five percent of U.S. adults have experienced tooth decay.[18] FDA has already promulgated regulations for a health claim regarding dental caries (tooth decay), recognizing caries as a disease that remains widespread throughout the U.S. population and that continues to impose a substantial burden on Americans.[19]

B. Fluoride and its Inhibition of Dental Caries (Tooth Decay)

1. General Characteristics of Fluoride

Fluoride is the ionic form of the element fluorine, the 13th most abundant element in the earth's crust. Fluoride is negatively charged and combines with positive ions, such as calcium or sodium, to form stable compounds such as calcium fluoride or sodium fluoride. These fluorides are released into the environment naturally in both water and air.[20] The Institute of Medicine ("IOM") has classified fluoride as a micronutrient, characterizing it, along with calcium, phosphorous, magnesium, and vitamin D, as an important constituent in maintaining health.[21]

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[15] CDC Recommendations for Fluoride Use at 3.

[16] CDC Recommendations for Fluoride Use, at 1.

[17] CDC Recommendations for Fluoride Use, at 5.

[18] CDC Recommendations for Fluoride Use, at 5.

[19] 21 C.F.R. § 101.80 (Health claims: dietary noncariogenic carbohydrate sweeteners and dental caries).

[20] CDC Recommendations for Fluoride Use, at 2.

[21] IOM DRI Report, *supra* note 5; *see also* Surgeon General Report, at 160.

2. Discovery of the Benefits of Fluoridated Water

The discovery of the anticaries benefit of fluoridated water began nearly a century ago. As detailed in the National Institute of Dental and Craniofacial Research's ("NIDCR") "The Story of Fluoridation,"[22] in the early 1900s, Dr. Frederick McKay, a dentist in Colorado Springs, and Dr. Green Vardiman Black, one of the nation's most eminent dental researchers, began to investigate the cause of severe brown staining of the teeth commonly observed in the population of Colorado Springs, a disorder that was not previously documented in the dental literature. While the staining or "mottled enamel," as it was then called, was cosmetically unacceptable, the researchers discovered that such afflicted teeth were also surprisingly resistant to decay. In 1923, McKay confirmed that the condition was attributable to the water supply. In 1931, with the assistance of water analyses from the Aluminum Company of America ("ALCOA"), which owned a company town in Bauxite, Arkansas where the mottled enamel disorder was also prevalent, McKay learned that the condition was caused by high levels of water-borne fluoride.[23]

This discovery sparked further investigation by PHS scientists, led by Dr. H. Trendley Dean, head of the Dental Hygiene Unit at the National Institutes of Health ("NIH"). Dean began investigating the epidemiology of enamel fluorosis (the term given to the mottled enamel condition once the cause was learned) in 1931. By comparing natural fluoride levels in drinking water across the country and the corresponding prevalence and severity of fluorosis, he concluded that fluoride levels of up to 1.0 ppm in drinking water did not cause enamel fluorosis in most people and only mild fluorosis in a small percentage of people.[24]

Dean then set out to investigate whether the addition of fluoride to drinking water at physically and cosmetically safe levels would help fight tooth decay. In conjunction with researchers from the PHS, the Michigan Department of Health added fluoride to the drinking water of Grand Rapids in 1945. The rate of tooth decay among the city's almost 30,000 children was monitored for 15 years in a study originally sponsored by the U.S. Surgeon General but then taken over by the National Institute of Dental Research, of which Dean became director. After only 11 years of the study, Dean announced the conclusion that the caries rate among Grand Rapids children born after fluoride was added to the water supply dropped more than 60 percent. This finding "amounted to a giant scientific breakthrough that promised to revolutionize dental care, making tooth decay for the first time in history a preventable disease for most people."[25]

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[22] Available at http://www.nidcr.nih.gov/HealthInformation/DiseasesAndConditions/Fluoride/StoryFluoride.htm.

[23] *Id.*

[24] *Id.*

[25] *Id.*

Today, 67 percent of the U.S. population is served by community water systems adjusted to provide optimal levels of fluoride.[26]

3. Mechanism by Which Fluoride Prevents Dental Caries (Tooth Decay)

Fluoride works to prevent dental caries both pre-eruptively and post-eruptively, and through a variety of mechanisms. The ingestion of fluoride during the pre-eruptive development of the teeth reduces the risk of dental caries due to the uptake of fluoride by enamel crystallites and formation of fluorhydroxyapatite.[27] Laboratory and epidemiologic research indicates, however, that fluoride's predominant effect is posteruptive and topical and that the effect depends on fluoride being in the right amount in the right place at the right time.[28] Frequent consumption of fluoridated drinking water and beverages and food processed in fluoridated areas maintains the concentration of fluoride in the mouth.[29] In this manner, adults also benefit from fluoride, rather than only children, as was previously assumed.[30]

Fluoride inhibits dental caries by affecting the activity of cariogenic bacteria. As fluoride concentrates in dental plaque, it inhibits the process of glycolysis by which fermentable carbohydrates are metabolized by cariogenic bacteria to produce acid, and also affects bacterial production of adhesive polysaccharides.[31] Fluoride also works to prevent dental caries through its effects on the dynamics of enamel de- and remineralization. Fluoride concentrated in plaque and saliva hinders the demineralization of sound enamel and aids the remineralization of demineralized enamel. When cariogenic bacteria metabolize carbohydrates and produce acid, fluoride is released from dental plaque as a reaction to lowered pH at the tooth-plaque interface. This released fluoride and the fluoride present in saliva are then taken up, along with calcium and phosphate, by de-mineralized enamel to establish an improved enamel crystal structure, which is more acid resistant and contains more fluoride and less carbonate. Fluoride is more easily taken up by demineralized enamel than by sound enamel. These cycles of demineralization and remineralization continue throughout the lifetime of the tooth.[32]

C. The Safety of Fluoride

The safety of fluoride in drinking water at concentrations greater than 0.6 mg/L and up to 1.0 mg/L – the range to be required for bottled water to be eligible to bear the instant

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[26] *See* CDC, Water Fluoridation, Background Information (August 2005), available at http://www.cdc.gov/OralHealth/waterfluoridation/benefits/background.htm.

[27] IOM DRI Report, at 288.

[28] CDC Recommendations for Fluoride Use, at 4.

[29] CDC Recommendations for Fluoride Use, at 9.

[30] CDC Recommendations for Fluoride Use, at 4.

[31] CDC Recommendations for Fluoride Use, at 3; Surgeon General Report, at 158-69; IOM DRI Report, at 290.

[32] CDC Recommendations for Fluoride Use, at 3; IOM DRI Report at 288-290.

health claim – is firmly established.[33] Extensive reviews of the scientific literature have confirmed that the only potential adverse health effects of fluoride in drinking water are skeletal fluorosis, increased risk of bone fracture, and severe enamel fluorosis, and that these rare health effects are associated with fluoride exposure well exceeding that of appropriately fluoridated drinking water.[34] At appropriate levels, the only adverse effect of fluoride in drinking water is mild to moderate enamel fluorosis, a solely cosmetic effect experienced by only a small percentage of consumers.

1. Appropriately Fluoridated Water Poses No Significant Adverse Health Effects

As discussed in greater detail in the Section II.D. of this Notification, the U.S. Environmental Protection Agency ("EPA") is responsible for the safety and quality of community drinking water. In setting a Recommended Maximum Contaminant Level ("RMCL") for fluoride as part of its National Primary Drinking Water Regulations, the EPA examined the relevant scientific literature relating to potential adverse health effects of fluoride, and concluded that the only such health effect established by the data is skeletal fluorosis, although only two reported cases had ever been observed in the U.S. at that time. The EPA established an RMCL for fluoride of 4.0 mg/L to protect against this condition.[35] Other than skeletal fluorosis, "EPA can find no evidence adequate to conclude that exposure to fluoride in U.S. drinking water is associated with other adverse health effects -- e.g., oncogenicity, mutagenicity."[36]

FDA has also affirmed the safety of fluoridated water within EPA limits. In its Final Rule on Food Labeling, Reference Daily Intakes ("RDIs"), in which FDA declined to establish an RDI for fluoride because there was not scientific consensus as to the essentiality of the nutrient, the agency rejected comments challenging the safety of such low levels of ingested fluoride.[37] In doing so, FDA considered the PHS Review of Fluoride, one of the sources of the authoritative statements in this Notification. FDA noted that the PHS Review could not

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[33] CDC Recommendations for Fluoride Use, at 3 ("The safety of fluoride, which has been documented comprehensively by other scientific and public health organizations (e.g., PHS, National Research Council, World Health Organization, and Institute of Medicine) is not addressed."); Surgeon General Report, at 160 ("the safety of fluoride is well documented and has been reviewed comprehensively by several scientific and public health organizations (Institute of Medicine (IOM) 1997, National Research Council (NRC) 1993, Newbrun 1996, U.S. Department of Health and Human Services (USDHHS) 1991, World Health Organization (WHO) 1984).").

[34] *See, e.g.*, Committee on Fluoride in Drinking Water, National Research Council, Fluoride in Drinking Water: A Scientific Review of EPA's Standards (2006) ("NRC Review of EPA's Standards"); IOM DRI Report, at 308.

[35] 50 Fed. Reg. 47142 (November 14, 1985) (National Primary Drinking Water Regulations; Fluoride; Final Rule).

[36] 50 Fed. Reg. 47142, 47147.

[37] 60 Fed. Reg. 67164, 67168 (December 28, 1995).

substantiate that there are adverse health effects or toxicities associated with low level fluoride exposure in normal individuals.[38] FDA also cited the 1993 findings of the Subcommittee on the Health Effects of Ingested Fluoride of the National Academy of Sciences Committee on Toxicology, which examined possible adverse health effects associated with fluoride intake, including dental fluorosis; bone fracture; reproductive, renal, gastrointestinal, and immunological toxicities; genotoxicity; and carcinogenicity. The Subcommittee concluded that the evidence did not support that any adverse health effects were associated with current levels of fluoride intake resulting from both ingestion of drinking water with a Maximum Contaminant Level ("MCL") for fluoride at 4 mg/L and other sources of fluoride such as toothpaste, mouth rinses, dietary fluoride supplements, and foods prepared with fluoridated water. Accordingly, "FDA reject[ed] the argument that the ingestion of low levels of fluoride is associated with adverse health effects and toxicities."[39]

In March of this year, the National Research Council ("NRC") of the National Academy of Sciences released its scientific review of EPA's drinking water standards. The NRC determined that severe enamel fluorosis constituted an adverse health effect, rather than merely a cosmetic effect, and concluded that EPA's MCL of 4 mg/L did not protect against this effect. A majority of the committee authoring the report also concluded that people who drink water at 4 mg/L of fluoride over a lifetime are likely to be at increased risk for bone fractures. The NRC found that the recent scientific evidence established no other disease or health risk from water with 4 mg/L fluoride. Based upon its findings, the NRC recommended that EPA's MCL of 4 mg/L should be lowered.[40] NRC made clear, however, that its report did not apply to the risks of fluoride concentrations of 0.7 to 1.2 mg/L, a range encompassing the fluoridation levels qualifying for the instant health claim.[41]

2. Appropriately Fluoridated Water Poses No Significant Adverse Cosmetic Effects

Enamel fluorosis refers to a range of visually detectable changes in enamel opacity that can result when fluoride ingested during tooth development causes hypomineralization. Because enamel is no longer susceptible once its preeruptive maturation is complete, concerns regarding the risk for enamel fluorosis are limited to children aged eight or younger. Very mild and mild forms of enamel fluorosis appear as chalklike, lacy markings across a tooth's enamel surface, while in moderate forms more than half of the enamel surface is opaque white.

As described above, Dean and colleagues established that fluoride levels of up to 1.0 ppm in drinking water did not cause enamel fluorosis to any degree in most people, and caused only mild enamel fluorosis in a small percentage of people. As discussed in the next

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[38] 60 Fed. Reg. 67164, 67167.

[39] 60 Fed. Reg. 67164, 67167-8.

[40] NRC Review of EPA's Standards, at 299.

[41] NRC Review of EPA's Standards, at 9.

section of this Notification, Dean's research and that of others led to the establishment of optimal levels of water fluoridation between 0.7 and 1.2 ppm, depending upon the annual average of maximum daily air temperatures, in order to assure the greatest protection against dental caries without increasing risk for enamel fluorosis.

Subsequent research has confirmed that water fluoridation in the range eligible to bear the instant health claim does not produce increased risk of enamel fluorosis. In 1986, EPA established a Secondary Maximum Contaminant Level ("SMCL") of 2.0 mg/L to protect against objectionable enamel fluorosis.[42] In the recent NRC Review of EPA's Standards, the NRC agreed with EPA's earlier findings that this SMCL would reduce the occurrence of moderate enamel fluorosis to 15% or less of the exposed population. However, the NRC recommended additional research to determine the degree to which moderate enamel fluorosis might go beyond a cosmetic effect to create an adverse psychological effect on children. In doing so, the NRC made clear that such potential concerns arose only with water fluoride concentrations greater than 1 mg/L, for it recommended such research only among U.S. communities with higher water fluoride concentrations.[43]

Public and dental health authorities continue to encourage more widespread water fluoridation as a public health measure even while the incidence of enamel fluorosis has increased in recent years among some subpopulations, for that increase has not been attributed to fluoridated water. Both the IOM and CDC concluded that this increase in fluorosis "almost certainly derives from the use of fluoride-containing dental products," rather than from fluoridated water.[44] Both scientific bodies reached this conclusion because fluoride intake from water and the diet has remained stable since the 1940s, whereas use of fluoride-containing dental products has markedly increased in the interim.[45]

The NRC Review of EPA's Standards highlighted a study,[46] published after the release of the CDC Recommendations for Fluoride Use, which examined the prevalence of esthetically objectionable fluorosis attributable to current water fluoridation policy.[47] The researchers found that only about 2% of U.S. schoolchildren may experience perceived esthetic problems that could be attributed to water fluoridated at 0.7 to 1.2 mg/L, and emphasized that

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[42] 51 Fed. Reg. 11396 (April 2, 1986) (National Primary and Secondary Drinking Water Regulations; Fluoride); 40 C.F.R. § 143.3.

[43] NRC Review of EPA's Standards, at 9.

[44] IOM DRI Report, at 312; CDC Recommendations for Fluoride Use, at 12 ("the increase in fluoride intake resulting in increased enamel fluorosis almost certainly stems from use of fluoride-containing dental products by children aged <6 years.").

[45] *Id.*

[46] NRC Review of EPA's Standards, at 98.

[47] Griffin SO, Beltran ED, Lockwood SA, Barker LK. Esthetically objectionable fluorosis attributable to water fluoridation. Community Dent Oral Epidemiol 2002: 30:199-209.

this value must be weighed against the lifetime benefits of fluoridation and the feasibility of alternative solutions relating to appropriate toothpaste use.[48]

The foregoing discussion of the evidence demonstrates that drinking water with fluoride concentrations above 0.6 and up to 1.0 ppm, the range allowed for bottled water products eligible to bear the instant health claim, poses no significant adverse cosmetic effects.

D. Establishment of Standards for Fluoridation of Drinking Water

1. Standards for Community Drinking Water

In 1962, the Public Health Service ("PHS") promulgated revised drinking water standards to which drinking water and water supply systems used by carriers and others subject to federal quarantine regulations had to conform. Those standards established control limits for both naturally occurring and added fluoride. PHS expressly recognized that

> Fluoride in drinking water will prevent dental caries. When the concentration is optimum, no ill effects will result and caries rates will be 60-65 percent below the rates in communities using water supplies with little or no fluoride.[49]

Accordingly, the PHS Drinking Water Standards provided for fluoridation of the water supply at "optimum" concentrations, which were determined to range from 0.7 to 1.2 mg/L, depending upon the annual average of maximum daily air temperatures.[50] Recommended control limits for added fluoride ranged from 0.6 to 1.7 mg/L. The standards also established that the presence of naturally occurring fluoride in average concentrations of more than twice the optimum values would constitute grounds for rejection of the supply.[51]

Optimum concentrations and control limits for fluoride were based upon temperature in reliance upon research by Galagan and colleagues in 1953 and 1957,[52] which

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[48] *Id.* at 208-9. The NRC Review of EPA's Standards also discussed another study, published prior to the CDC Recommendations for Fluoride Use, in which researchers estimated the prevalence of fluorosis of esthetic concern in the United Kingdom to be 15% at fluoride concentrations of 1.2 mg/L, and 6% at a baseline of 0.1 mg/L. McDonagh MS, et al. Systematic review of water fluoridation. BMJ 2000; 321:855-859. The NRC committee concluded, however, that study design flaws produced an overestimation of the prevalence of fluorosis of esthetic concern. NRC Review of EPA's Standards, at 98-9.

[49] Public Health Service Drinking Water Standards. Washington, DC: U.S. Dept. of Health, Education, and Welfare, Public Health Service, 1962 ("PHS Drinking Water Standards") (relevant portions attached as Attachment 6), at 41.

[50] PHS Drinking Water Standards, at 8.

[51] PHS Drinking Water Standards, at 8.

[52] Galagan DJ, Lamson GG. Climate and endemic dental fluorosis. Pub Health Rep. 1953 May; 68:497-508; Galagan DJ. Climate and controlled fluoridation. J Am Dent A. 1953 August; 47: 159-170; Galagan DJ, Vermillion JR, Nevitt GA, Stadt AM, Dart RE. Climate and fluid intake. (continued...)

purported to demonstrate that the optimum fluoride level for a given community depends on climatic conditions because the amount of water, and therefore the amount of fluoride, ingested by children is primarily influenced by air temperature.[53] These limits were established as follows:[54]

Annual average of maximum daily air temperatures[1] in °F	Recommended control limits—Fluoride concentrations in mg/l		
	Lower	Optimum	Upper
50.0-53.7	0.9	1.2	1.7
53.8-58.3	0.8	1.1	1.5
58.4-63.8	0.8	1.0	1.3
63.9-70.6	0.7	0.9	1.2
70.7-79.2	0.7	0.8	1.0
79.3-90.5	0.6	0.7	0.8

[1] Based on temperature data obtained for a minimum of five years.

In 1974, the Safe Drinking Water Act amended the Public Health Service Act and gave the EPA responsibility for the safety and quality of community drinking water. While EPA's initial National Interim Primary Drinking Water Regulations retained the temperature-based criteria in establishing maximum contaminant levels for fluoride identical to those set forth in the preexisting PHS standards, EPA revised its National Primary Drinking Water regulations in 1985 to eliminate these temperature-based criteria.[55]

EPA abandoned the temperature-dependent standard because more recent and extensive drinking water information and a reanalysis of the technical basis of the current standard demonstrated that, while tap water consumption may be affected by climate to a limited degree, the effect does not warrant adjustment of national drinking water standards.[56] This conclusion was based on an assessment of the significant limitations of the old Galagan data, a recent survey in Canada demonstrating that tap water consumption by both adults and children

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Pub Health Rep. 1957 June; 72: 484-490; Galagan DJ, Vermilion JR. Determining optimum fluoride concentrations. Pub Health Rep. 1957 June; 72: 491-493 (*cited in* PHS Drinking Water Standards, at 8-9).

[53] PHS Drinking Water Standards, at 8.

[54] PHS Drinking Water Standards, at 8, Table 1.

[55] 50 Fed. Reg. 47142; 40 C.F.R. § 141.51. EPA established a single Recommended Maximum Contaminant Level ("RMCL") for fluoride in drinking water at 4 mg/L, independent of temperature. EPA later finalized the 4.0 mg/L level as the MCL for fluoride in 1986, when it also established the single SMCL for fluoride at 2.0 mg/L. 51 Fed. Reg. 11396.

[56] 50 Fed. Reg. 47142, 47159.

does not vary with temperatures below 70°F, and more recent U.S. data demonstrating that variations in temperature do not appear to significantly affect tap water consumption for the population as a whole.[57] EPA also observed that the National Academy of Sciences did not endorse temperature dependency in their recommendations on fluoride, that the World Health Organization ("WHO") set a single level of 1.5 mg/L as its recommended limit for fluoride, and that EPA has not used a temperature dependent standard for any other contaminant.[58] However, CDC recommendations for the addition of fluoride to community drinking water continue to be based upon the old PHS temperature-dependent scheme.[59]

2. Standards for Bottled Drinking Water

Section 410 of the FDCA obligates FDA, whenever EPA prescribes interim or revised national primary drinking water regulations, to consult with EPA and to "either promulgate amendments to regulations under this chapter applicable to bottled drinking water or publish in the Federal Register . . . reasons for not making such amendments."[60] In this manner, FDA's bottled water regulations are intended to parallel EPA's regulations for community drinking water, in recognition of the fact that bottled water can be sourced from, and substitutes in the diet for, community drinking water.

In 1973, FDA promulgated standards of quality that established limits on fluoride in bottled water consistent with the 1962 PHS Drinking Water Standards.[61] These standards provided that bottled water could not contain naturally occurring fluoride in excess of 1.4 to 2.4 mg/L (twice the PHS optimum range of 0.7 to 1.2 mg/L), or added fluoride in excess of 0.8 to 1.7 mg/L (the PHS upper control limit levels). After EPA revised its primary and secondary drinking water standards to establish a single MCL and SMCL[62] for fluoride independent of temperature, FDA proposed to amend its bottled water standards in a manner consistent with the EPA standards.[63] The agency stated its belief that EPA's new SMCL of 2.0 mg/L is the appropriate quality standard for fluoride in bottled water that is naturally occurring. When fluoride is added, FDA proposed a quality standard of 1.3 mg/L fluoride. While the agency did not recommend purposeful addition of fluoride in excess of the optimum level of 1.0 mg/L, it

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[57] 50 Fed. Reg. 47142, 47149.

[58] 50 Fed. Reg. 47142, 47150.

[59] *See, e.g.*, U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention, "Engineering and Administrative Recommendations for Water Fluoridation, 1995," MMWR 1995;44(No. RR-13):1-40, at 8, available at http://www.cdc.gov/mmwr/PDF/rr/rr4413.pdf.

[60] 21 U.S.C. § 349(a).

[61] 38 Fed. Reg. 32558 (November 26, 1973).

[62] MCLs are enforceable standards for the protection of the public health. SMCLs are not federally enforceable but are intended as guidelines for the states for the protection of the public welfare, and generally control contaminants that primarily affect the aesthetic qualities relating to the public acceptance of drinking water. 50 Fed. Reg. 47142; 40 C.F.R. § 143.1.

[63] 53 Fed. Reg. 36063 (September 16, 1988).

expressed that the slightly higher level of 1.3 mg/L is an acceptable variation for compliance purposes because it is the recommended PHS upper control limit corresponding to the 1.0 mg/L optimum level.[64]

In 1995, FDA promulgated a final rule establishing a standard of identity for bottled water, recodifying and incorporating the existing standard of quality.[65] While the agency did not amend the temperature-based criteria for fluoride concentrations in the quality standard at that time, it stated that FDA would be proceeding with its 1988 proposed rulemaking now that EPA had published a notice of intent not to revise its fluoride drinking water standards. Although FDA has not implemented that proposal, it has not retreated from its position that a single standard for naturally occurring fluoride and a single standard for added fluoride is the approach that is both appropriate and grounded in current science.[66] Accordingly, there remains a dichotomy between the temperature-based criteria for fluoride in bottled water in the standard of quality and the temperature-independent MCL and SMCL in EPA's national drinking water regulations, while both FDA and EPA have accepted that such temperature stratification is no longer validated by current scientific evidence.

III. Statutory Basis for Health Claims Based on Authoritative Statements

In order to assure that public health guidance established by authoritative government scientific bodies can be readily disseminated to the public on product labeling to help educate consumers and inform at the point of purchase, Congress amended the FDCA as part of FDAMA to establish notification provisions for health and nutrient content claims based upon such authoritative statements. These notification provisions implement Congress's intent to provide "streamlined procedures"[67] to assure that concrete health benefits that should accrue from government recommendations about the relationship between nutrition and health are not delayed unnecessarily by a lengthy and burdensome FDA regulatory process when expert government authorities have already determined the relationship to be valid.

The FDAMA health claim notification provisions state that a health claim shall be authorized and may be made with respect to a food if:

> (i) a scientific body of the United States Government with official responsibility for public health protection or research directly relating to human nutrition (such as the National Institutes of Health or the Centers for Disease Control and Prevention) or the National Academy of Sciences or any of its subdivisions has published an authoritative statement, which is currently in effect,

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[64] 53 Fed. Reg. at 36066.

[65] 60 Fed. Reg. 57076 (November 13, 1995).

[66] FDA withdrew this proposed rule, among other inactive proposals, on November 26, 2004, due to competing priorities. 69 Fed. Reg. 68831.

[67] H.R. Rep. No. 105-399, at 98 (1997).

about the relationship between a nutrient and a disease or health-related condition to which the claim refers;

(ii) a person has submitted to the Secretary, at least 120 days (during which the Secretary may notify any person who is making a claim as authorized by clause (C) that such person has not submitted all the information required by such clause) before the first introduction into interstate commerce of the food with a label containing the claim,

(I) a notice of the claim, which shall include the exact words used in the claim and shall include a concise description of the basis upon which such person relied for determining that the requirements of subclause (i) have been satisfied,

(II) a copy of the statement referred to in subclause (i) upon which such person relied in making the claim, and

(III) a balanced representation of the scientific literature relating to the relationship between a nutrient and a disease or health-related condition to which the claim refers;

(iii) the claim and the food for which the claim is made are in compliance with clause (A)(ii) and are otherwise in compliance with paragraph (a) and section 201(n); and

(iv) the claim is stated in a manner so that the claim is an accurate representation of the authoritative statement referred to in subclause (i) and so that the claim enables the public to comprehend the information provided in the claim and to understand the relative significance of such information in the context of a total daily diet.

For purposes of this clause, a statement shall be regarded as an authoritative statement of a scientific body described in subclause (i) only if the statement is published by the scientific body and shall not include a statement of an employee of the scientific body made in the individual capacity of the employee. [68]

FDA provided clarification of its interpretation of the FDAMA notification provisions in its June 11, 1998 Guidance for Industry, "Notification of a Health Claim or Nutrient Content Claim Based on an Authoritative Statement of a Scientific Body" ("FDAMA

[68] 21 U.S.C. § 343(r)(3)(C).

Guidance").[69] In that Guidance, FDA enumerated six criteria for what constitutes an authoritative statement, four of which are taken from the language of the statute and two more that the agency derived from the legislative history of the statute. FDA states that an authoritative statement supportive of a FDAMA notification for a health claim:

> (1) is "about the relationship between a nutrient and a disease or health-related condition";
>
> (2) is "published by the scientific body";
>
> (3) is "currently in effect";
>
> (4) "shall not include a statement of an employee or the scientific body made in the individual capacity of the employee";
>
> (5) should reflect a consensus within the identified scientific body if published by a subdivision of one of the Federal scientific bodies; and
>
> (6) should be based on a deliberative review by the scientific body of the scientific evidence.

Additionally, FDA concluded that FDAMA upholds the "significant scientific agreement" ("SSA") standard for health claims, and therefore the agency intends to determine, in accordance with the general statutory provision for health claims at section 403(r)(3)(B)(i) of the FDCA, whether, "based on the totality of publicly available scientific evidence (including evidence from well-designed studies conducted in a manner which is consistent with generally recognized scientific procedures and principles), that there is significant scientific agreement among experts qualified by scientific training and experience to evaluate such claims, that the claim is supported by such evidence."[70]

As described in detail below, this Notification satisfies all criteria for FDAMA health claims, including that there exists significant scientific agreement that the proposed claim describing the relationship between fluoridated water and prevention of dental caries (tooth decay) is valid. This FDAMA health claim is also consonant with the objectives of FDA's recent Consumer Health Information for Better Nutrition Initiative, which is intended to help consumers obtain accurate, up-to-date, science-based information, particularly on food labeling, to encourage healthy dietary choices, and also to encourage competition based on the health benefits of their food and beverage products.[71] The claim will enable and encourage consumers

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[69] Available at http://www.cfsan.fda.gov/~dms/hclmguid.html.

[70] FDAMA Guidance at 2, citing section 403(r)(3)(B)(i) of the FDCA (21 U.S.C. § 343(r)(3)(B)(i)).

[71] *See, e.g.*, FDA, Center for Food Safety and Applied Nutrition ("CFSAN"), FDA Implements Enhanced Regulatory Process to Encourage Science-Based Labeling and Competition for (continued...)

to select fluoridated drinking water to retain the dental benefits that would be achieved had the consumers chosen fluoridated tap water or other beverages made from fluoridated water, and will encourage manufacturers to market appropriately fluoridated bottled water products.

IV. Authoritative Statements Describing Relationship Between Fluoridated Water and Prevention of Dental Caries (Tooth Decay)

A. IOM Dietary Reference Intakes For Fluoride

Because of the crucial role of fluoride in preventing dental caries, the Standing Committee on the Scientific Evaluation of Dietary Reference Intakes, Food and Nutrition Board, Institute of Medicine, established an Adequate Intake ("AI") for fluoride in 1997. The IOM's estimate of requirements for fluoride was based solely on fluoride's caries prevention effect; no other nutritional benefit of fluoride justified the AI.[72]

In affirming that fluoride's "ability to inhibit, and even reverse, the initiation and progression of dental caries is well known,"[73] the IOM considered the body of scientific literature concerning fluoride and dental health. The IOM concluded:

> A large number of studies have shown that fluoridated drinking water increases resistance to dental caries at all ages.[74]

Additionally, after summarizing the results of two major surveys of the difference in caries prevalence between fluoridated and nonfluoridated regions in the United States even after the widespread introduction of fluoridated dental products and intercommunity transport of foods and beverages, the IOM concluded:

> [W]ater fluoridation continues to be of major importance in the control of dental caries.[75]

These conclusions represent authoritative statements providing sound support for the proposed health claim regarding the relationship between fluoridated water and prevention of dental caries (tooth decay). These statements, which are currently in effect, represent clear and unambiguous conclusions of the IOM drawn after extensive review of the scientific data. The summary of the DRI volume explains the criteria for establishing dietary reference intakes:

Healthier Dietary Choices. July 10, 2003, available at http://www.cfsan.fda.gov/~dms/nuttfbg.html.

[72] IOM DRI Report, at 301 ("The AI is based on estimated intakes that have been shown to reduce the occurrence of dental caries maximally in a population without causing unwanted side effects including moderate dental fluorosis.").

[73] IOM DRI Report, at 288.

[74] IOM DRI Report, at 299.

[75] IOM DRI Report, at 298.

> The scientific data for developing DRIs were obtained from clinical trials; dose-response, balance, depletion/repletion, prospective observational, and case control studies; and clinical observations in humans. Studies that measured actual dietary and supplement intake were given more weight than studies that depended on self-reported food and supplement intake. Studies published in peer-reviewed journals were the principal source of data. The data were considered by life stage and gender to the extent possible. This allowed examination of possible physiologic differences in nutrient requirements and utilization. . . . After careful review and analysis of the evidence, scientific judgment was used to determine what indicator of function or other criterion would be used as the basis of the requirement in establishing the EAR, AI, or UL.
>
> For each nutrient, the strengths and weaknesses of relevant studies were assessed. . . . Where applicable, the strength, consistency, and preponderance of the data and the degree of concordance in epidemiological, clinical, and laboratory evidence influenced the selection of the indicators and the derivation of the EARs, AIs, or ULs.[76]

Plainly, the DRI for fluoride was established based upon a comprehensive evaluation of the scientific literature pertaining to the relationship between fluoride and dental caries and dental health (including incidence of fluorosis).

The Institute of Medicine is a subdivision of the National Academy of Sciences ("NAS"), and as such is one of the scientific bodies expressly identified in the FDAMA statute as a source for published authoritative statements that may form the basis of a FDAMA health claim.[77] The NAS itself has set forth a policy statement as to which of its statements NAS considers to be authoritative for purposes of supporting FDAMA health or nutrient content claims.[78] In contrast to statements that might not summarize the totality of evidence or those that constitute descriptive materials or minority reports, NAS states,

> For the purposes of the Food and Drug Administration Modernization Act of 1997, authoritative statements of the National Academy of Sciences of any of its subdivisions, including the National Research Council and Institute of Medicine, are limited to those that represent the consensus of a duly-appointed

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[76] DRI Report at 9-10.

[77] *See* 21 U.S.C. § 343(r)(3)(C)(i).

[78] National Research Council, Governing Board of NAS. Authoritative Statements of the Academy Complex with Regard to the Food and Drug Administration Modernization Act of 1997 (Attachment 7).

> committee or views of a duly-appointed principal investigator so that they appear explicitly as findings, conclusions, or recommendations in a report that has completed the institutional report review process.[79]

The IOM DRI for fluoride represents the consensus of a duly-appointed committee, and the statements above appear explicitly as findings and conclusions in a report that has completed the institutional report review process. Accordingly, the statements cited above constitute valid authoritative statements that support the FDAMA health claim describing the relationship between fluoridated water and prevention of dental caries (tooth decay).

Finally, FDA accepted a notification for a nutrient content claim for choline based upon an authoritative statement from IOM's "Dietary Reference Intakes for Thiamin, Riboflavin, Niacin, Vitamin B6, Folate, Vitamin B12, Pantothenic Acid, Biotin, and Choline."[80] The agency's acceptance of that notification establishes that IOM conclusions in DRI reports constitute authoritative statements for purposes of supporting FDAMA claims. Similarly, the IOM conclusions in the fluoride DRI report constitute authoritative statements supporting the proposed FDAMA health claim for fluoride and prevention of dental caries (tooth decay).

B. CDC Recommendations for Using Fluoride to Prevent Dental Caries

CDC's "Recommendations for Using Fluoride to Prevent and Control Dental Caries in the United States" is a comprehensive set of recommendations to provide guidance to dental and health care providers, public health officials, and the general public on the best practices in using fluoride to prevent tooth decay.[81] The first recommendation, for public health and clinical practice, is "Continue and Extend Fluoridation of Community Drinking Water," and under this heading the CDC affirms that

> Community water fluoridation is a safe, effective, and inexpensive way to prevent dental caries.[82]

Additionally, earlier in the report, CDC asserts that

> Regardless of SES [socioeconomic status], water fluoridation is the most effective and efficient strategy to reduce dental caries.[83]

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[79] *Id.*

[80] *See* FDA, CFSAN. Nutrient Content Claims Notification for Choline Containing Foods. August 30, 2001, *available at* http://www.cfsan.fda.gov/~dms/flcholin.html.

[81] *See, e.g.,* CDC Press Release. CDC Releases New Guidelines on Fluoride Use to Prevent Tooth Decay. August 17, 2001 *available at* http://www.cdc.gov/OralHealth/pressreleases/flouride.htm [sic] ("CDC Fluoride Report Press Release").

[82] CDC Recommendations for Fluoride Use, at 26.

These constitute authoritative statements supportive of the proposed FDAMA health claim that fluoridated water can prevent dental caries (tooth decay).

Significantly, it is clear from the report and attendant CDC documents that the effectiveness of water fluoridation in preventing dental caries is not limited to fluoridated community water, but rather extends to appropriately fluoridated bottled water as well. Indeed, the first sentence of CDC's press release describing the report explains that the CDC "today issued new recommendations for fluoride use in the present-day environment of widespread use of bottled waters and availability of a host of fluoride-containing products."[84] CDC recognizes the current public health problem that

> Many persons drink bottled water, replacing tap water partially or completely as a source of drinking water. . . . Although some bottled waters marketed in the United States contain an optimal concentration of fluoride (approximately 1.0 ppm), most contain <0.3 ppm fluoride. Thus, a person substituting bottled water with a low fluoride concentration for fluoridated community water might not receive the full benefits of community water fluoridation.[85]

Moreover, one of the report's recommendations for Consumer Product Industries and Health Agencies is that producers of bottled water should label the fluoride concentration of their products, to allow consumers to make informed decisions and dental and other health-care professionals to appropriately advise patients regarding fluoride intake and use of fluoride products.[86] This recommendation is significant for purposes of this Notification in two respects. First, it further affirms the logical conclusion that appropriately fluoridated bottled water could readily substitute for fluoridated community drinking water and provide the same caries prevention benefits. Second, it reveals the importance of providing information about fluoride on the labeling of bottled water. The proposed health claim would require labeling of the fluoride concentration as a condition for eligibility to bear the claim, and also provides the more substantive benefit of explaining the role and importance of fluoridated water in the diet.

The statements quoted above satisfy all statutory and FDA requirements for authoritative statements supportive of FDAMA health claim notifications. They are about the relationship between fluoride and dental caries, published by the CDC which is a scientific body of the government specifically identified in the statute, and are currently in effect.[87] While the

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[83] CDC Recommendations for Fluoride Use, at 11.

[84] CDC Fluoride Report Press Release, at 1.

[85] CDC Recommendations for Fluoride Use, at 12-13.

[86] CDC Recommendations for Fluoride Use, at 28.

[87] Among its recommendations for further research, CDC stated that descriptive and analytic epidemiologic studies should be conducted to determine the association between dental caries and fluoride exposure from several sources, as well as the current role of community water fluoridation in preventing coronal and root caries among adults. CDC Recommendations for (continued...)

report's comprehensive recommendations were developed by a work group of 11 specialists in fluoride research or policy convened by CDC during the late 1990s and reviewed by an additional 23 specialists,[88] the report itself represents the recommendations of CDC as a whole.[89] The Recommendations are solidly based on a deliberative review of the scientific evidence, as reflected in the report itself, which contains, in addition to the Recommendations, "a) critical analysis of the scientific evidence regarding the efficacy and effectiveness of fluoride modalities in preventing and controlling dental caries, b) ordinal grading of the quality of the evidence, and c) assessment of the strength of each recommendation."[90] The report explains in detail that members of the work group identified the published research in their areas of expertise and evaluated the quality of scientific evidence for each fluoride modality in preventing dental caries. The evidence was drawn from the most relevant English-language, peer-reviewed scientific publications regarding the current effectiveness of fluoride modalities, and additional references were suggested by reviewers.[91]

Significantly, CDC's "Recommendations for Using Fluoride to Prevent and Control Dental Caries in the United States" is exactly the same type of CDC recommendation that motivated the enactment of the FDAMA health claim provisions. In 1992, CDC published its "Recommendations for the Use of Folic Acid to Reduce the Number of Cases of Spina Bifida and Other Neural Tube Defects."[92] Congress subsequently drafted the FDAMA provisions for health and nutrient content claims based upon authoritative statements by scientific bodies of the U.S. government with responsibility for public health protection, so that important public health information already established and accepted by such government bodies, such as that in CDC's folic acid recommendations, could not be withheld or delayed from being disseminated on food labels.[93] As the CDC Recommendations for Fluoride Use are equivalent to CDC's Recommendations for the Use of Folic Acid, the CDC findings and recommendations quoted above constitute precisely the types of authoritative statements Congress had in mind as supportive of FDAMA health claim notifications.

Fluoride Use, at 30. This recommendation in no way undermines the current authoritativeness of the statements quoted above as supportive of the proposed FDAMA health claim. To the contrary, the report continues to affirm the proven benefit of fluoridated water for adults. *See* CDC Recommendations for Fluoride Use, at 11 ("Drinking water containing an optimal concentration of fluoride can mitigate the risk factors for caries among older adults. Studies have reported that the prevalence of root caries among adults is inversely related to fluoride concentration in the community drinking water.").

[88] CDC Recommendations for Fluoride Use, at 2.

[89] *See, e.g.,* CDC Fluoride Report Press Release, at 1 (characterizing recommendations as those of CDC).

[90] CDC Recommendations for Fluoride Use, at 1.

[91] CDC Recommendations for Fluoride Use, at 19.

[92] MMWR 1992;41(No. RR-14).

[93] *See* H.R. Rep. No. 105-306, at 16 (1997); S. Rep. No. 105-43, at 49-50 (1997).

Finally, CDC officials have explained that recommendation reports such as the CDC Recommendations for Fluoride Use are the types of documents it would consider to be sources for authoritative statements for FDAMA notifications. At a May 11, 1999, FDA public meeting on health and nutrient content claims based on authoritative statements, then-Associate Director for Science, Dixie Snider, MD, who served as the central liaison between CDC and FDA on the issue of FDAMA claims, explained that CDC's reports of recommendations on how to prevent public health threats would be considered official CDC policy and therefore supportive of such FDAMA health or nutrient content claims.[94] As CDC's report on recommendations for fluoride use represents its position after exhaustive review of the body of relevant scientific evidence, and affirms conclusively that water fluoridation reduces dental caries, the authoritative statements quoted above support the proposed FDAMA health claim regarding fluoridated water and prevention of dental caries (tooth decay).

C. Oral Health in America: A Report of the Surgeon General

In 2000, the Surgeon General released the first-ever Surgeon General's Report on Oral Health in America. The intent of this report was to alert Americans to the full meaning of oral health and its importance to general health and well-being; and to propose solutions that will ensure that health promotion and disease prevention programs are enhanced for all Americans, based on a National Oral Health Plan and through coordination of government agencies and officials, private industry, foundations, consumer groups, health professionals, educators, and researchers.[95]

In the Executive Summary of this Report, within the section titled, "Major Findings," the Surgeon General states unequivocally that:

> Community water fluoridation is safe and effective in preventing dental caries in both children and adults.[96]

Additionally, in his summary on community water fluoridation, the Surgeon General concludes that:

> Epidemiological studies carried out during the last five decades provide strong evidence supporting the effectiveness of water fluoridation in preventing coronal and root caries in children and adults. Further support of effectiveness comes from studies that indicate that caries experience increases in communities that no longer fluoridate the water supply (and where there are few other exposures to fluorides). . . . [C]ommunity water fluoridation is

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[94] Designated Sources for "Authoritative" Statements Discouraged. The Tan Sheet. 1999 May 17; 7(20):4.

[95] Surgeon General Report, at iii (Message from Donna E. Shalala, Secretary of Health and Human Services).

[96] Surgeon General Report, at 10.

> recommended as a very effective and cost-effective method of preventing coronal and root caries in children and adults.[97]

The Surgeon General Report contains numerous supplemental statements affirming the relationship between fluoridated water and prevention of dental caries, and ultimately cites pending CDC recommendations as giving community water fluoridation an "A" for strength of recommendation.[98] The two statements set forth above were selected because they appear in the Executive Summary/Major Findings sections, and in the summary on community water fluoridation, emphasizing that these are the Surgeon General's ultimate conclusions.

FDA Guidance expressly provides that Surgeon General Reports are appropriate sources of authoritative statements for FDAMA health claim notifications.[99] Notably, FDA cited an earlier Surgeon General Report discussing the established relationship between fluoridated water and prevention of tooth decay as the basis for the agency's allowance of optional fluoridation of standardized bottled water.[100] Moreover, this Report clearly satisfies the criteria for sources of FDAMA authoritative statements. First, the conclusions cited above were based upon a comprehensive and deliberative review of the relevant scientific literature. In the Executive Summary, the Surgeon General explains the science base for the Report:

> This report is based on a review of the published scientific literature. Standards established to determine the quality of the evidence, based on the study design and its rigor, were used where appropriate. In addition, the strength of the recommendations, where they are made, is based on evidence of effectiveness for the population of interest. The scope of the review encompassed the international English literature.[101]

Second, the Report is published by a recognized authoritative body – the Surgeon General – and represents the conclusions of the Office of the Surgeon General and related government organizations. The Surgeon General explains the expert input and senior oversight of the Report, resulting in consensus as to conclusions:

> The report was generated with the advice and support of a Federal Coordinating Committee composed of representatives of agencies with oral health components and interests. The chapters were based on papers submitted by experts working under the guidance of a coordinating author for each chapter. Independent peer review was

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[97] Surgeon General Report, at 161-2.

[98] Surgeon General Report, at 159.

[99] FDAMA Guidance, at 2 ("For example, authoritative statements by the Surgeon General would normally be found only in the Surgeon General Reports.").

[100] 60 Fed. Reg. 57076, 57079; *see also* discussion at Section VI.A., *infra.*

[101] Surgeon General Report, at 5.

> conducted for all sections of the report at various stages in the process, and the full manuscript was reviewed by a number of senior reviewers as well as the relevant federal agencies.[102]

Finally, the Report remains currently in effect. Accordingly, because the foregoing statements asserting that fluoridated water prevents dental caries are made in definitive portions of a recognized authoritative document, they constitute authoritative statements upon which a FDAMA health claim may be based.

D. PHS Review of Fluoride: Benefits and Risks[103]

The PHS Review of Fluoride is described in the Introduction as "a comprehensive review and evaluation of the public health benefits and risks of fluoride from drinking water and other sources."[104] After exhaustively detailing the results of this comprehensive review, the report sets forth its "Conclusions," the first of which is:

> Extensive studies over the past 50 years have established that individuals whose drinking water is fluoridated show a reduction in dental caries.[105]

This conclusion constitutes an authoritative statement for the purposes of supporting the proposed FDAMA health claim concerning the relationship between fluoridated water and reduced risk of dental caries (tooth decay). It is published by the Public Health Service, which, although not specifically denominated in FDAMA, is arguably the premier scientific body of the United States Government with official responsibility for public health protection. While the report was prepared by the Ad Hoc Subcommittee on Fluoride of the PHS Committee to Coordinate Environmental Health and Related Programs ("CCEHRP"), it was approved by the CCEHRP and published by the PHS itself, thus reflecting a consensus within PHS. Although it was published in 1991, the report remains "currently in effect," as it has not been overturned by PHS or any other government entity and continues to be cited as authority in more recent statements of scientific bodies of the U.S. government.[106]

The Review of Fluoride is based on an extensive and deliberative review of the scientific evidence. The data analyzed in the report include: human and animal studies published in the biomedical literature on both the benefits and the risks of fluoride; a study conducted by the National Toxicology Program on sodium fluoride; the FDA's review of a chronic bioassay animal study sponsored by the Procter and Gamble Company; and new epidemiological studies performed by the National Cancer Institute. Additionally, to ensure

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[102] Surgeon General Report, at 5.

[103] PHS Review of Fluoride, *supra* note 2.

[104] PHS Review of Fluoride, at 1.

[105] PHS Review of Fluoride, at 87.

[106] *See, e.g.* CDC Recommendations for Fluoride Use, at 3, 7; Surgeon General Report at 161.

public input, an announcement was published in the Federal Register soliciting peer-reviewed, published articles on fluorides. Over 100 articles were submitted in response to that notice, and were considered by the Subcommittee in its Review of Fluoride.[107] In sum, the quoted PHS conclusion is an authoritative statement supporting the proposed FDAMA health claim regarding the relationship between fluoridated drinking water and reduced risk of dental caries (tooth decay).

V. Exact Wording of the FDAMA Health Claim

The following claim characterizing the relationship between the consumption of fluoridated water and the prevention of dental caries satisfies the requirements of FDAMA and is intended for use in the labeling of bottled water products identified in Section VI.A. of this Notification:

"Drinking fluoridated water reduces the risk of [dental caries or tooth decay]."

In specifying the disease, the above health claim allows the terms "dental caries" and "tooth decay" to be used interchangeably, consistent with FDA regulations at 21 C.F.R. 101.80(c)(2)(D).[108] The authoritative statements supporting this health claim also recognize the equivalence of the terms "dental caries" and "tooth decay."[109] Accordingly, claims using the terms "dental caries" or "tooth decay" are accurate reflections of the authoritative statements supporting the proposed FDAMA health claim.

Although FDA's FDAMA Guidance suggests that submitted health claims should use the word "may" to characterize the relationship between the nutrient and the disease or health-related condition so as to indicate that the disease or condition is caused by many factors,[110] the term "may" is not appropriate for the instant health claim because its use would mischaracterize the authoritative statements upon which this Notification is based. These statements declare without qualification the long-established and continually affirmed relationship between appropriately fluoridated water and prevention of dental caries (tooth decay).[111] Using the term "may" would in fact be misleading in this context. Further, imposing

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[107] PHS Review of Fluoride, Electronic Executive Summary, available at http://www.health.gov/environment/ReviewofFluoride/default.htm

[108] 21 C.F.R. § 101.80(c)(2)(D) ("In specifying the disease, the claim uses the following terms: "dental caries" or "tooth decay.").

[109] *See, e.g.,* CDC Recommendations for Fluoride Use, at 1 ("Dental caries (i.e., tooth decay) is an infectious, multifactorial disease afflicting most persons in industrialized countries and some developing countries. Fluoride reduces the incidence of dental caries and slows or reverses the progression of existing lesions (i.e., helps prevent cavities).").

[110] FDA FDAMA Guidance, at 3.

[111] While FDA's current health claim at 21 C.F.R.§ 101.80 for noncariogenic carbohydrate sweeteners and dental caries uses "may reduce the risk" terminology, the instant claim is a FDAMA health claim that must reflect the language of the authoritative statements of government scientific bodies upon which this Notification relies.

the use of the term "may" on the proposed claim would contravene the First Amendment rights of those using the claim to convey their truthful and nonmisleading message in the language of their choice.[112]

VI. Nature of the Food Eligible to Bear the Claim

The food eligible to bear the health claim regarding fluoridated water and prevention of dental caries (tooth decay) is bottled water meeting the standards of identity and quality set forth at 21 C.F.R. § 165.110, and containing greater than 0.6 and up to 1.0 mg/L fluoride. This food meets all general requirements for food eligible to bear health claims set forth at 21 C.F.R. § 101.14, except for the minimum nutrient contribution requirement at 101.14(e)(6), which should be waived for the reasons discussed below. Products bearing the health claim must also meet the labeling requirements identified below.

A. Bottled Water Appropriately Bears the Health Claim Based Upon the Foregoing Authoritative Statements

It is evident that the authoritative statements quoted in Section IV of this Notification apply equally to bottled water and community drinking water. Indeed, the concerns and recommendations expresses in the CDC Recommendations for Fluoride Use discussed above make clear that bottled water substitutes for community drinking water, and that it is in the interest of public health for bottled water to be comparably fluoridated and for that fact to be made clear to consumers and dental health professionals through product labeling.

FDA's recognition of the equivalence of bottled water and community drinking water is the foundation for the agency's allowance of optional fluoridation of standardized bottled water, and is based upon an earlier Surgeon General Report addressing the dental health benefit of fluoridated community drinking water. In the preamble to the final rule establishing the bottled water standards, FDA states:

> The agency recognizes that water with fluoride added may provide a benefit to consumers. The Surgeon General's Report on Nutrition and Health (the Surgeon General's Report) recommends that community water systems contain fluoride at optimal levels for prevention of tooth decay and that, if such water is not available, other appropriate sources of fluoride should be used. Bottled water may be used by some consumers as an alternative to community drinking water. Therefore, because of the unique circumstances presented by fluoride, the agency is providing for the optional addition of fluoride to bottled water in § 165.110(a)(1)

[112] *See, e.g., Riley v. Nat'l Federation of the Blind of North Carolina*, 487 U.S. 781, 790-791 (1988) (explaining that the "First Amendment mandates that we presume that speakers, not the government, know best both what they want to say and how to say it.").

within the limitations established in the quality standard (165.110(b)(4)(ii)).[113]

The administrative record therefore makes clear that FDA acknowledges the public health benefit of bottled water fluoridated at levels commensurate to community drinking water, and that authoritative statements from appropriate government bodies concerning fluoridation would extend equally to bottled water and community drinking water.

In light of the serious concerns that have recently been expressed about consumers' substitution of minimally fluoridated bottled water for fluoridated community drinking water, the proposed health claim will provide the considerable public health benefits of helping consumers identify appropriately fluoridated bottled water and understand the importance of fluoridated water in the diet, and encouraging bottled water producers to compete on the basis of fluoridation of their products. In this manner, the proposed health claim is consistent with the objectives of FDA's Consumer Health Information for Better Nutrition Initiative, which is intended to encourage the dissemination of accurate, science-based nutrition information, including on the food label, and to encourage food firms to compete on the health effects of their products. These recent developments reveal that circumstances have greatly changed since FDA hesitated to encourage addition of fluoride to bottled water when promulgating its original nutrient content claim regulations in 1993.[114]

At that time, FDA allowed the use of the terms "fluoridated," "fluoride added," or "with added fluoride" on the labeling of bottled water containing added fluoride, in recognition of the fact that the presence of fluoride in bottled water is of interest to consumers because of its ability to help reduce dental caries.[115] However, FDA declined to establish criteria for terms like "good source of fluoride" or "high in fluoride" because it did not wish to encourage "unnecessary addition of fluoride to bottled water."[116] Now, addition of fluoride to bottled water indeed appears to be "necessary," and FDA policies now encourage manufactures to formulate their products in ways that promote the public health and to express those benefits, where substantiated, in product labeling. In the current environment, the proposed health claim for fluoridated bottled water and reduced risk of dental caries (tooth decay) is fully supported by authoritative statements of four separate scientific bodies of the U.S. government, and is expected to deliver the significant public health benefit of aiding consumers in choosing bottled waters that are supportive of dental health.

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[113] 60 Fed. Reg. 57076, 57079 (citing U.S. Dept. of Health and Human Services. Public Health Service Publication No. 88-50210. The Surgeon General's Report on Nutrition and Health, U.S. Government Printing Office, Washington, DC, 1988).

[114] 58 Fed. Reg. 2302, 2314 (January 6, 1993).

[115] 58 Fed. Reg. 2302, 2314; 21 C.F.R § 101.13(q)(8).

[116] 58 Fed. Reg. 2302, 2314. Additionally, IOM had not yet established the current Dietary Reference Intakes for fluoride.

B. Fluoride Concentrations Greater than 0.6 and Up to 1.0 mg/L Are Safe and Effective for Prevention of Dental Caries (Tooth Decay)

Bottled water products containing greater than 0.6 and up to 1.0 mg/L fluoride will be eligible to bear the health claim regarding fluoridated water and prevention of dental caries (tooth decay). These concentrations are independent of temperature. As discussed in detail in Section II.D., above, EPA has abandoned temperature-dependent limits for fluoride in community drinking water, and FDA has proposed doing the same for bottled water, because the more recent scientific evidence no longer supports that water intake varies by temperature. CDC has also expressed doubt about the continued viability of temperature-based guidelines in its Recommendations for Fluoride Use in light of current evidence,[117] and lists among its recommendations for further research the need to reevaluate the temperature-based method of determining optimal fluoride concentration of community drinking water.[118]

The study cited in those CDC Recommendations analyzed current water consumption patterns based upon the 1994-96 Continuing Survey of Food Intakes by Individuals ("CSFII"), and concluded that the recent data revealed no obvious strong or consistent association between water intake and month or season. These results caused the researchers to question the need for recommending different water fluoridation levels according to mean maximum temperature.[119] Another study on fluid consumption related to climate among children examined data from the third National Health and Nutrition Examination Survey ("NHANES III," 1988-94), and similarly found no significant association between the amount of either total fluid or plain water intake and mean daily maximum temperature. The researchers concluded that there is no evidence that fluid consumption among children is significantly related to mean temperature in modern conditions, suggesting that the national temperature-related guidelines for fluoride concentration in drinking water may be due for reevaluation.[120] A recent study examined seasonal variation in fluoride intake specifically. The researchers found small seasonal variation in mean fluoride consumption from beverages, with slightly higher intakes during the summer months, but the magnitude of the variations was quite low, "suggesting that seasonal/climatic alterations in water fluoride levels are probably unnecessary."[121]

Finally, the WHO also observed that societal developments since the temperature-dependent standards were initially established have rendered such stratification unnecessary. WHO states that "[e]ven in the United States of America, where they were developed, the advent

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[117] CDC Recommendations for Fluoride Use, at 10.

[118] CDC Recommendations for Fluoride Use, at 29.

[119] Heller KE, Sohn W, Burt BA, Eklund SA. Water Consumption in the United States in 1994-96 and Implications for Water Fluoridation Policy. J Public Heath Dent. 1999;59:3-11.

[120] Sohn W, Heller KE, Burt BA. Fluid Consumption Related to Climate among Children in the United States. J. Public Health Dent. 2001:61:99-106.

[121] Broffitt B, Levy SM, Warren JJ, Heller KE. Seasonal Variation in Fluoride Intake: the Iowa Fluoride Study. J Public Heath Dent. 2004;64:198-204, at 203.

of air-conditioning, the increased consumption of processed soft drinks and processed foods, and the increasing availability of other sources of fluoride were rendering obsolete the assumptions upon which the range was based."[122]

Accordingly, given the current state of the scientific evidence, there is no reason to regress to the old temperature-dependent scheme that has now been discredited. The instant FDAMA health claim would be allowed on bottled water products with fluoride concentrations greater than 0.6 and up to 1.0 mg/L because this is the range established to be both safe and effective for prevention of dental caries based upon current evidence. EPA analytical methods for fluoride may be used for compliance purposes.[123]

1. The Specified Concentrations are Safe

While the criteria set forth in this Notification would allow bottled water products to bear the health claim if they contain greater than 0.6 mg/L and up to 1.0 mg/L fluoride, independent of temperature, the bottled water standards continue to limit the concentration of fluoride based upon temperature. Accordingly, the health claim criteria do not change the status quo with respect to allowable, safe fluoride concentrations in standardized bottled water.

2. The Specified Concentrations are Effective

Concentrations of greater than 0.6 mg/L and up to 1.0 mg/L fluoride are effective in the prevention of dental caries. This is evidenced by the fact that the Fluoride Supplement Dosage Schedule for U.S. and Canadian Children recommends no fluoride supplementation where the drinking water fluoride concentration is greater than 0.6 mg/L, regardless of air temperature. This dosing schedule thus reveals that fluoride concentrations above 0.6 mg/L are deemed sufficient for caries prevention in any climate in North America.[124]

The WHO has also confirmed the effectiveness of these concentrations of fluoride. In its background document for development of WHO's Guidelines for Drinking-water Quality, WHO explained that the minimum concentration of fluoride in drinking water required to provide pre- and post-eruptive protection against dental caries is approximately 0.5 mg/L, and that these protective effects increase with fluoride concentration up to about 2 mg/L, regardless of air temperature or climatic conditions.[125] To err on the conservative side in assuring that all

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[122] WHO Technical Report Series 846. Fluorides and Oral Health: Report of a WHO Expert Committee on Oral Health Status and Fluoride Use. Geneva: WHO, 1994 ("WHO, Fluorides and Oral Health") (Attachment 8), at 18.

[123] 40 C.F.R. § 141.23(f)(10).

[124] Reprinted in IOM DRI Report, at 295, Table 8-3 (Source: American Dental Association, 1994; Canadian Paediatric Society, 1996); also reprinted in CDC Recommendations for Fluoride Use, at 8, Table 1.

[125] World Health Organization (WHO). Fluoride in Drinking-water: Background document for development of WHO Guidelines for Drinking-water Quality. Geneva: WHO, 2004 ("WHO, Fluoride in Drinking-water"), available at http://www.who.int/entity/water_sanitation_health/dwq/chemicals/fluoride.pdf, at 5.
(continued...)

products bearing the health claim contain adequate concentrations of fluoride, however, this Notification requires such bottled water products to contain greater than 0.6 mg/L, consistent with the fluoride supplement dosing schedule and the lower end of the historical PHS recommended control limits for added fluoride.[126]

C. Bottled Water Products Meet All General Health Claim Criteria Except Minimum Nutrient Contribution Requirement, Which Should Not Apply

1. Bottled Water Products Meet General Health Claim Criteria

The bottled water products eligible to bear the proposed health claim, as described in section VI.A., above, meet all general health claim criteria set forth in 21 C.F.R. § 101.14 except for the minimum nutrient contribution requirement at 21 C.F.R. § 101.14(e)(6), which should be waived for the reasons described in the following section. These bottled water products are safe and otherwise lawful, and products subject to the bottled water standard of identity and quality must meet the requirements of that standard to be eligible to bear the proposed health claim. The subject of the claim – fluoridated water – is a "food" and qualifies as a "substance," which is defined in 21 C.F.R. § 101.14(a)(2) as a "specific food or component of food." This substance is associated with a disease or health-related condition for which the general U.S. population is at risk, for dental caries (tooth decay) meet this criterion as discussed in Section II.A. of this Notification. Finally, the eligibility criteria described above assure that bottled water products bearing the health claim contain a fluoride concentration that is sufficiently high to justify the claim.

2. The Minimum Nutrient Content Contribution Requirement Should Not Preclude the Health Claim for Bottled Water Products

Fluoridated bottled water products satisfy the objectives behind the requirement at 21 C.F.R. § 101.14(e)(6) that a food bearing a health claim contain 10 percent or more of the Reference Daily Intake or the Daily Reference Value for specified nutrients (the "minimum nutrient contribution requirement"). Therefore the language of that rule should not preclude a health claim for this food. FDA adopted that criterion "to preclude health claims on foods that do not make a nutritional contribution to the diet and thus are inconsistent with dietary guidelines."[127] The agency intended for the requirement to ensure that the value of health claims would not be compromised by their use on foods with little or no nutritional value, such as foods where "sources of calories are [not] coupled with sources of nutrient."[128] In accordance with

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Considering the risks of adverse effects of high fluoride intakes, however, WHO concludes that the optimum fluoride concentration will normally be within the range of 0.5-1.0 mg/L. WHO, Fluorides and Oral Health, at 19.

[126] The PHS recommended control limits for added fluoride ranged form 0.6 to 1.7 mg/L, as discussed in Section D.1. of this Notification.

[127] 58 Fed. Reg. at 2489, 2521-22 (January 6, 1993) (Health Claims Final Rule)

[128] 58 Fed. Reg. 2489, 2521.

these objectives, FDA has exempted foods from the minimum nutrient requirement when an exemption will "assist consumers in maintaining healthy dietary practices."[129]

The IOM has affirmed that water is essential to nutrition and hydration.[130] A critical element of a healthy diet, water is unlike the chewing gums and confectioneries made with noncariogenic sweeteners that provide "little or no nutritional value" that FDA nevertheless exempted from the minimum nutrient contribution requirement in allowing these foods to bear dental caries health claims.[131] Significantly, FDA observed when exercising its enforcement discretion for green tea that tea is "an essentially non-caloric food composed mostly of water," and as such, it does not impede the "ability of consumers to maintain healthy dietary practices."[132] Given this precedent, there would be no grounds for allowing this requirement to preclude this FDAMA health claim for bottled water.

FDA has further recognized that the purpose of the minimum nutrient requirement may be outweighed by public health benefits gained from an exemption from the requirement.[133] Dental caries represents "an important and widespread public health problem in the United

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[129] CFSAN, Letter Responding to Health Claim Petition dated January 27, 2004: Green Tea and Reduced Risk of Cancer Health Claim (June 30, 2005) ("Green Tea QHC Letter"), available at http://www.cfsan.fda.gov/~dms/qhc-gtea.html. By regulation, FDA has exempted from the requirements of 21 C.F.R. 101.14(e)(6) dietary supplements, noncariogenic carbohydrate sweetener-containing foods, and dressings for salad that contain plant sterol esters. *See* 21 C.F.R. §§ 101.14(e)(6), 101.80(c)(1), 101.83(c)(1). FDA has also waived these requirements in permitting qualified health claims for green tea, walnuts, and monounsaturated fatty acids in olive oil, dressings for salads, and shortenings. *See* FDA/CFSAN, "Qualified Health Claims Subject to Enforcement Discretion," available at http://www.cfsan.fda.gov/~dms/qhc-sum.html.

[130] In its Dietary Reference Intakes for Water, Potassium, Sodium, Chloride, and Sulfate, IOM explained:

> The largest single constituent of the human body, water, is essential for cellular homeostasis and life. It provides the solvent for biochemical reactions, is the medium for material transport, and has unique physical properties (high specific heat) to absorb metabolic heat. Water is essential to maintain vascular volume, to support the supply of nutrients to tissues, and to remove waste via the cardiovascular system and renal and hepatic clearance. Body water deficits challenge the ability of the body to maintain homeostasis during perturbations (e.g., sickness, physical exercise, or climatic stress) and can impact function and health.

Institute of Medicine Dietary Reference Intakes for Water, Potassium, Sodium, Chloride, and Sulfate. Washington, DC: National Academy Press, 2004 (available at http://www.nap.edu/books/0309091691/html/), at 4.

[131] 60 Fed. Reg. 37507, 37524 (July 20, 1995).

[132] Green Tea QHC Letter, at 16.

[133] 65 Fed. Reg. at 54686, 54711 (September 8, 2000)(Plant Sterol/Stanol Esters and Coronary Heart Disease Health claims Interim Final Rule).

States."[134] The public health benefits of water fluoridation and the nutritive value of water itself thus warrant an exemption of fluoridated bottled water from the minimum nutrient contribution requirement, consistent with FDA's waiver of that requirement for the far less nutritive noncariogenic carbohydrate sweeteners.[135]

Finally, imposing the minimum nutrient contribution requirement to prohibit the proposed health claim that is supported by nearly universal consensus of scientific and public health experts across the globe would raise serious First Amendment concerns. Fundamental First Amendment principles make clear that the government bears a heavy burden in suppressing truthful and nonmisleading speech. Any restriction on commercial speech must be narrowly tailored to the government interest at issue, and must be no more extensive than necessary to remedy concrete harm.[136] Broad prophylactic rules may not substitute for the requisite exacting analysis of the means-ends fit in every instance of speech suppression.[137] Accordingly, the minimum nutrient contribution requirement must not operate to restrict the truthful and nonmisleading claim that drinking fluoridated water reduces the risk of dental caries (tooth decay).

D. Labeling Requirements

The labels of bottled water bearing the proposed health claim must include nutrition facts. The labels must also identify the concentration of fluoride in the water, which shall be expressed in mg/L, consistent with the manner expressed in EPA and FDA standards and the dietary fluoride supplement dosage schedule for U.S. and Canadian children. This requirement reflects CDC's Recommendation for Consumer Product Industries and Health Agencies that producers of bottled water should label the fluoride concentration of their products, to allow consumers to make informed decisions and dental health professionals to appropriately advise patients regarding fluoride intake and use of fluoride products.[138]

VII. Review of the Scientific Literature on the Relationship Between Fluoridated Water and Prevention of Dental Caries (Tooth Decay)

A review of the relevant body of scientific literature concerning the relationship between fluoridated water and prevention of dental caries further affirms this relationship and highlights the significant scientific agreement that drinking fluoridated water reduces the risk of

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[134] 60 Fed. Reg. at 37524 (Sugar Alcohols and Dental Caries Health Claims Proposed Rule).

[135] 21 C.F.R. § 101.80(c)(1).

[136] *See, e.g.*, *Central Hudson Gas & Electric Corp. v. Public Service Comm'n of N.Y.*, 447 U.S. 557 (1980); *Edenfield v. Fane*, 507 U.S. 761, 770 (1993); *Zauderer v. Office of Disciplinary Counsel of the Supreme Court of Ohio*, 471 U.S. 626, 651 (1985).

[137] *See, e.g.*, *Edenfield*, 507 U.S. at 777 ("'Broad prophylactic rules in the area of free expression are suspect. Precision of regulation must be the touchstone in an area so closely touching our most precious freedoms.'") (quoting *NAACP v. Button*, 371 U.S. 415, 438 (1963)).

[138] CDC Recommendations for Fluoride Use, at 28.

dental caries (tooth decay). This section of the Notification addresses both the scientific literature evaluated in the four sources of authoritative statements described above, and the literature published subsequent to the most recent of these, the CDC Recommendations for Fluoride Use, including the relevant English language publications from around the world. This balanced representation of the scientific literature reveals the nearly universal findings of the caries prevention benefit of fluoridated water, for the very few studies suggesting little or no effect were either deemed flawed by reviewing government authorities or were conducted under circumstances not representative of the experience of the general U.S. population.

A. Scientific Literature Reviewed in Sources of Authoritative Statements

1. IOM Dietary Reference Intakes for Fluoride

The IOM's comprehensive and rigorous approach to evaluating the scientific literature regarding the relationship between fluoridated water and reduced risk of dental caries (tooth decay) is described generally in Section IV.A., above. IOM considered data from the early pioneering research concerning the discovery of fluoride's caries prevention effect through studies published the year prior to the Report.

IOM stated that many studies conducted prior to the availability of fluoride-containing dental products showed that the prevalence of dental caries in communities with optimal water fluoride concentrations was 40 to 60 percent lower than in areas with low water fluoride concentrations.[139] IOM observed that more recent studies show a smaller effect, citing Brunelle and Carlos (1990), who summarized the results of the 1986–1987 national survey conducted by the National Caries Program of the National Institute of Dental Research ("NIDR National Caries Program"). They found that the overall difference in caries prevalence between fluoridated and nonfluoridated regions in the United States was 18 percent, but the difference increased to 25 percent after excluding children with a history of exposure to dietary fluoride supplements or topical fluorides. Significantly, IOM cited Brunelle and Carlos' findings that the differences in caries prevalence within geographic regions were inversely proportional to the percentages of water supplies that were fluoridated as evidence of the important role for the "halo" or diffusion effect. These terms refer to the fact that beverages and food processed in fluoridated areas but consumed in nonfluoridated areas indirectly spreads some benefit of fluoridated water to nonfluoridated communities, thereby lessening the differences in caries experience among communities. IOM concluded that the results of that 1986-87 survey, like that of the 1979–1980 national survey conducted by the NIDR National Caries Program, indicate that water fluoridation continues to be of major importance in the prevention of dental caries.[140]

IOM also examined the evidence concerning the cariostatic effect of fluoride exposure at various ages and stages of tooth development, and cited studies demonstrating that both pre- and posteruptive exposures to fluoride have cariostatic effects (Dawes, 1989;

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[139] IOM DRI Report, at 297 (citing Russell and Elvove, 1951).

[140] IOM DRI Report, at 297-98.

Hargreaves, 1992; Horowitz, 1990).[141] However, the long-term study conducted by Groeneveld et al. (1990) and several other retrospective clinical studies (Hargreaves et al., 1988; Lewis, 1976; Stephen et al., 1987) have shown that the earlier children are exposed to fluoridated water, the greater the reduction in dental caries in both the primary and permanent teeth.[142]

Based upon its thorough review of the scientific evidence, IOM concluded that a "large number of studies have shown that fluoridated drinking water increases resistance to dental caries at all ages,"[143] and declared, in the first sentence of its "General Observations" section, that the "cariostatic effect associated with residence in communities served with optimally fluoridated water (ca. 1 mg/liter) has been confirmed by numerous epidemiological studies conducted in countries throughout the world."[144]

2. CDC Recommendations for Fluoride Use

As discussed in Section IV.B. of this Notification, members of the work group convened by CDC identified the published research in their areas of expertise and evaluated the quality of scientific evidence for each fluoride modality in preventing dental caries. The evidence was drawn from the most relevant English-language, peer-reviewed scientific publications regarding the current effectiveness of fluoride modalities, and additional references were suggested by reviewers. While members used their own methods for critically analyzing articles and a formal protocol for duplicate review was not followed, members collectively agreed on the grade reflecting the quality of evidence regarding each fluoride modality. The criteria used to grade the quality of scientific evidence was adapted from the U.S. Preventive Services Task Force.[145]

Like IOM, CDC observed that initial studies of community water fluoridation demonstrated that reductions in childhood dental caries attributable to fluoridation were approximately 50% to 60%, but that more recent estimates are lower, ranging from 18% to 40%. CDC concluded that this decrease in attributable benefit is likely caused by the increasing use of fluoride from other sources, most notably, the widespread use of fluoride toothpaste. Additionally, CDC also cited the diffusion or "halo" effect described in the previous section. CDC concluded further that adults are reported to receive caries-preventive benefits from community water fluoridation, although quantifying the benefits of water fluoridation among adults is more complicated because adults are rarely surveyed, their fluoride histories are

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[141] IOM DRI Report, at 298.

[142] IOM DRI Report, at 298-99.

[143] IOM DRI Report, at 299, discussing as examples Jackson et al., 1973 and Wiktorsson et al., 1992.

[144] IOM DRI Report, at 301 (citing Horowitz, 1996).

[145] U.S. Preventive Services Task Force. Guide to Clinical Preventive Services. 2d ed. Alexandria, VA: International Medical Publishing, 1996.

potentially more varied, and their tooth loss or restorations might be caused by dental problems other than caries.[146]

CDC concluded that the quality of evidence from studies on the effectiveness of adjusting fluoride concentration in community water to optimal levels is Grade II-1.[147] CDC explained that a grade of I (the only higher grade available) is not possible for community water fluoridation, because the criteria for that grade are evidence obtained from one or more randomized clinical trials. Studies on the effectiveness of adjusting fluoride in community water cannot be designed as randomized clinical trials, because random allocation of study subjects is not possible when all community residents are exposed to fluoridated water. Nor can clinical studies be conducted as double-blind because both subjects and researchers usually know whether the community's water is fluoridated. However, CDC concluded that research limitations for community water fluoridation are counterbalanced by broadly similar results from numerous well-conducted field studies by other investigators that included thousands of people throughout the world.[148] On the basis of the strong and consistent body of scientific evidence, CDC gave community water fluoridation its strongest recommendation, with a code of "A" -- "Good evidence to support the use of the modality."[149]

3. Surgeon General Report

As noted above, the conclusion of the Surgeon General Report that community water fluoridation is safe and effective in preventing dental caries in both children and adults was based upon a comprehensive examination of the relevant international English literature. The Report recounted CDC's findings as to the quality of evidence and code "A" recommendation for community water fluoridation, which was in press at the time and published a year later. The Report also detailed the Surgeon General's independent evaluation of the relevant scientific evidence.

The Surgeon General explained, as did CDC, that there are no randomized, double-blind, controlled trials of water fluoridation because its community-wide nature does not permit randomization of subjects to study and control groups. The Surgeon General concluded, however, that such studies are not only infeasible but unnecessary, because similar results have been gleaned from many well-conducted field studies by different investigators on thousands of subjects across the globe.[150]

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[146] CDC Recommendations for Fluoride Use, at 11.

[147] CDC Recommendations for Fluoride Use, at 20. The criteria for a grade of II-1 is evidence obtained from one or more controlled clinical trials without randomization (i.e., one using systematic subject selection, some type of concurrent controls, valid and reliable measurements, and well-controlled study protocols).

[148] CDC Recommendations for Fluoride Use, at 20.

[149] CDC Recommendations for Fluoride Use, at 24, 25.

[150] Surgeon General Report, at 160.

The Surgeon General described two major reviews of the relevant scientific literature. Murray et al. (1991) performed an extensive review of 95 studies conducted between 1945 and 1978, and reported the modal caries reduction following water fluoridation to be between 40 and 50 percent for primary teeth and 50 and 60 percent for permanent teeth. Newbrun (1989) reported on more than 60 studies conducted during the 1970s and early 1980s, limiting his review to those with concurrent control groups because of the ongoing decrease in dental caries in both fluoridated and nonfluoridated areas. The evidence from comparisons of fluoride-deficient and fluoridated communities in the United States, Australia, Britain, Canada, Ireland, and New Zealand has consistently demonstrated the continued effectiveness of water fluoridation. The Surgeon General cited this evidence and the PHS Review of Fluoride in stating that caries reductions ranged between 15 and 40 percent in fluoridated, as compared with fluoride-deficient, communities.[151]

The Surgeon General also considered studies of populations where fluoridation has ceased, and reported that studies in the United States, Germany, and Scotland have shown that when fluoridation is withdrawn and there are few other fluoride exposures, the prevalence of caries increases (Kunzel and Fisher 1997, Seppä et al. 1998; Stephen et al. 1987).[152]

In sum, the Surgeon General concluded that "[e]pidemiological studies carried out during the last five decades provide strong evidence supporting the effectiveness of water fluoridation in preventing coronal and root caries in children and adults."[153]

4. PHS Review of Fluoride

The PHS reviewed the scientific literature regarding fluoridated water and reduced risk of dental caries beginning with the pioneering work of Dean in 1942 through papers published in 1990, the year before the PHS Review of Fluoride was published. Based upon this review, PHS stated that "[r]educed dental caries following fluoridation of water supplies has been shown many times."[154] The PHS relays the results of studies and reviews showing marked reduction in caries prevalence after the earliest experiences with deliberate fluoridation of water supplies in Grand Rapids, Michigan (Arnold et al., 1956), Newburgh, New York and Evanston, Illinois (McClure, 1970). PHS also described the Newbrun survey, discussed in the Surgeon General Report, and addressed individually the studies published in previous decade, which continued to demonstrate the anticaries benefit of fluoridated water (e.g., Rugg-Gunn, et al., 1981; Szpunar and Burt, 1988; Heifetz et al., 1988).[155] PHS also found confirmation of the caries prevention benefit of fluoridated water in at least six studies of communities where water fluoridation was discontinued, and dental caries prevalence subsequently increased (Jordan,

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[151] Surgeon General Report, at 160-61.

[152] Surgeon General Report, at 161.

[153] Surgeon General Report, at 161.

[154] PHS Review of Fluoride, at 20.

[155] PHS Review of Fluoride, at 20.

1962; Way, 1964; Lemke et al., 1970; Stephen et al., 1987; Kunzel, 1980; Attwood and Blinkhorn, 1989 and 1990).[156]

To exclude alternative explanations of the anticaries benefit of fluoridated water, PHS considered the work of three principal proponents of alternative hypotheses for the reduction of caries scores attributed to fluoridation (Colquhoun, 1985; Colquhoun, 1990; Diesendorf, 1986; Yiamouyiannis, 1990). PHS found these works to be flawed or unsupported by evidence.[157]

PHS ultimately concluded that "[e]xtensive studies over the past 50 years have established that individuals whose drinking water is fluoridated show a reduction in dental caries."[158]

B. "Promoting Oral Health – A Report on Recommendations of the Task Force on Community Preventive Services"

Shortly after the release of the CDC Recommendations for Fluoride Use, CDC published "Promoting Oral Health: Interventions for Preventing Dental Caries, Oral and Pharyngeal Cancers, and Sports-Related Craniofacial Injuries – A Report on Recommendations of the Task Force on Community Preventive Services."[159] The Task Force is independent and nonfederal, but its Report is part of the development of the Guide to Community Preventive Services, created with support from CDC, the U.S. Department of Health and Human Services ("HHS"), other federal agencies, and other public and private partners. The Report and related publications provide guidance to decision makers in state and local health departments, managed care organizations, purchasers of health care, persons responsible for funding public health programs, and others who have interest in or responsibility for improving oral and related general health in all segments of the population.[160]

The Task Force conducted systematic reviews of the evidence of effectiveness of selected population-based interventions to prevent dental caries, including community water fluoridation, and ultimately strongly recommended community water fluoridation for prevention of dental caries.[161] To be included in the rigorous review of the scientific evidence, a study had to involve primary investigation of an intervention selected for evaluation, be published in English between 1966 and December 31, 2000, be conducted in established market economies, and compare outcomes among populations exposed to the intervention with outcomes among populations not exposed or less exposed to the intervention.[162] In addition to these inclusion

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[156] PHS Review of Fluoride, at 32-34.

[157] PHS Review of Fluoride, at 27-28.

[158] PHS Review of Fluoride, at 87.

[159] MMWR 2001;50(No. RR-21):1-14 ("Task Force Report") (Attachment 9).

[160] Task Force Report, at 2.

[161] Task Force Report, at 1.

[162] Task Force Report, at 4, 6.

criteria, studies also had to meet quality criteria. The Report explains that each study was evaluated using a standardized abstraction form and assessed for suitability of the study design and threats to validity. Studies were then characterized as having good, fair, or limited execution. Finally, the strength of the body of evidence of effectiveness was characterized as strong, sufficient, or insufficient on the basis of the number of available studies, the suitability of study designs for evaluating effectiveness, the quality of execution of the studies, the consistency of the results, and the effect size.[163] The Task Force then systematically linked evidence to recommendations, with the strength of evidence of effectiveness corresponding directly to the strength of recommendations. Based on the evidence of effectiveness, the Task Force strongly recommended community water fluoridation for the prevention of dental caries.[164]

The Task Force's recommendations and a detailed review of the scientific evidence it considered were also published in the American Journal of Preventive Medicine, in a special supplement devoted to the Report and related papers.[165] In its review of the evidence,[166] the Task Force explains its selection of 21 qualifying studies of the effectiveness of starting or stopping community water fluoridation in reducing dental caries and describes the studies categorically. Appendix B to that Review describes each study in greater detail in table form. The studies were published from the 1950s to 2000, and were conducted in the United States, the United Kingdom, Australia, the Netherlands, Canada, Finland, Germany, Japan, Libya, Singapore, and Taiwan. Six of the studies examined the effects of stopping fluoridation that had been ongoing for many years, and fifteen examined the effects of starting or continuing fluoridation. The fluoride concentrations in intervention water systems varied from 0.6 to 1.8 ppm, compared to 0 to 0.8 ppm in non-intervention systems. All of the study populations involved children 4 to 17 years old. Caries experience was measured in both primary and permanent teeth. The Task Force concluded that the diverse community water fluoridation exposures and populations in these studies are typical of the range of circumstances encountered in the United States over the time span of the review, and therefore that the results of the review should apply to most populations in the United States and other industrialized countries.[167]

The Task Force divided the qualifying studies into three groups. Group A included those with before-and-after measurements of caries at the tooth level, in studies with concurrent comparison groups. In the seven Group A studies measuring the effect of starting or continuing community water fluoridation, such fluoridation decreased dental caries experience by a median of 29.1% during 3 to 12 years of follow-up. Five measures, reported in two of the studies (Kunzel and Fisher, 1997; Evans et al., 1996), showed an increase in dental caries upon

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[163] Task Force Report, at 6.

[164] Task Force Report, at 7.

[165] Am. J. Prev. Med. 2002;23(1S).

[166] Truman BI, et al., The Task Force on Community Preventive Services. Reviews of Evidence on Interventions to Prevent Dental Caries, Oral and Pharyngeal Cancers, and Sports-Related Craniofacial Injuries. Am. J. Prev. Med. 2002;23(1S)21-54 ("Task Force Review of Evidence") (Attachment 10).

[167] Task Force Review of Evidence, at 27.

continuing water fluoridation. The Task Force concluded that these inconsistent estimates of effectiveness appear to have resulted from inadequate control of confounding due to substantially lower baseline caries prevalence in fluoridated versus non-fluoridated areas. The Task Force observed that if these inconsistent estimates are excluded from the analysis, then starting water fluoridation decreased dental caries experience by a median of 41.2% (ranging from 14.5% to 110%). The three Group A studies that evaluated stopping fluoridation showed a median 17.9% increase in dental caries during 6 to 10 years of follow-up.[168]

Group B included post-exposure measurements of caries at the tooth level, in studies with concurrent comparison groups. All of the seven studies in this group measured the effect of starting or continuing community water fluoridation, and showed a median of 50.7% decrease in dental caries experience during 3 to 12 years of follow-up. Although the Task Force could not quantitatively combine effect measures from groups A and B, it concluded that "both seem to support the conclusion that community water fluoridation reduces dental caries by 30% to 50%, and that stopping such fluoridation may lead to a median 17.9% increase in caries where alternative sources of fluoride are inadequate.[169] Group C included studies that measured the effects of community water fluoridation on caries at any level, using any study design. The Task Force explained that this subset of effect measures did not alter the main findings of the analyses in groups A and B, and therefore the Task Force published details of these studies only on its website and not in the journal publication.[170]

Based upon this comprehensive and detailed review of the relevant scientific evidence published around the world, the Task Force concluded that "strong evidence shows that CWF [community water fluoridation] is effective in reducing the cumulative experience of dental caries within communities."[171]

C. Subsequently-Published Scientific Literature Regarding Fluoridated Water and Caries Prevention

Since the publication of the CDC Recommendations for Fluoride Use, the most recent of the four sources of authoritative statements supporting this Notification, and the Task Force Report, both published in late 2001, numerous studies have continued to demonstrate the association between appropriately fluoridated water and a substantial reduction in the prevalence and incidence of dental caries. Of the relevant English-language studies identified by a search of the domestic and international scientific literature published between January 2001 and April 2006, nearly all conclude that appropriately fluoridated water is associated with a decline in experience of dental caries. The few studies that did not reach this conclusion were conducted outside of the United States, and do not reflect the experience of the American population.

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[168] Task Force Review of Evidence, at 26-7.

[169] Task Force Review of Evidence, at 26-7.

[170] Task Force Review of Evidence, at 26.

[171] Task Force Review of Evidence, at 28.

These studies are discussed briefly below, and full citations are provided in the Bibliography section of this Notification.

Most of the relevant studies focused upon the caries experience of children and adolescents. Those studies supporting the correlation between fluoridated water and a reduced risk of dental caries are summarized below:

- Two articles reporting on the Iowa Fluoride Study, a longitudinal cohort study of children from Iowa from birth forward, assessed a range of factors affecting caries experience among children aged 4-7 years, including water fluoridation, other food and beverage consumption, and antibiotic use. While a number of factors contributed to caries experience, water consumption was shown to have a protective effect, and water fluoride intake was strongly and inversely associated with severe caries experience (Levy, et al., 2003; Mariri et al., 2003).

- A 2005 study of nearly 250,000 children in Australia found that caries experience of 5-6 year-olds was significantly lower for children living in areas with fluoridated water than those in nonfluoridated areas in 6 of the 8 regions studied for which such comparisons could be made. Caries experience of 11-12 year-olds was similarly lower for children in fluoridated areas in 6 of the 10 regions studied (Armfield, 2005).

- The results of a cross-sectional study of 8,030 5 year-old and 6,916 12 year-old children in New Zealand indicated that caries prevalence and severity was consistently and significantly lower for children living in an area with fluoridated water. Researchers performed a multivariable analysis to confirm the independent association between water fluoridation and better dental health (Lee et al., 2004).

- A study of a random sample of 9,988 children enrolled in a dental service in South Australia employed multivariate modeling to reveal a significant positive relationship between primary teeth caries experience and the consumption of nonpublic, non-fluoridated water. Based on these findings, the researchers recommended that fluoride be added to bottled water to benefit the oral health of children (Armfield et al., 2004).

- A cross-sectional study of a representative, random, stratified sample of 17,851 children in the Republic of Ireland in 2002 concluded that caries levels were lower among children with fluoridated domestic water supplies (Whelton et al., 2004).

- Whelton and colleagues recently published another analysis of those study results to compare the caries incidence between children with fluoridated water in the Republic of Ireland and children in Northern Ireland, which has no water fluoridation programs. This study aimed to control for the benefit of the fluoride diffusion effect, since food and beverages in Northern Ireland were unlikely to be manufactured with fluoridated water. These results confirmed that the oral health of children and adolescents resident in fluoridated communities is better than those who reside in non-fluoridated communities that do not benefit from the diffusion effect (Whelton et al., 2006).

- To assess both the direct benefit of water fluoridation and the benefit from the diffusion of fluoride into nonfluoridated communities through bottled beverages and processed foods, researchers analyzed data from the 1986-87 NIDR Children's Survey for 18,507 school children using regression analysis and a comparison of age-adjusted mean decayed, missing, and filled permanent tooth surfaces ("DMFS") of children not exposed to dietary fluoride supplements or sealants. They found that U.S. children residing in nonfluoridated areas with low diffusion exposure experienced higher levels of caries than did children living in fluoridated communities or in nonfluoridated areas with high diffusion exposure (Griffin et al., 2001).

- After controlling for confounding factors, researchers comparing 1,422 5 year-olds living in fluoridated areas of the United Kingdom with 4,779 living in nonfluoridated areas concluded that water fluoridation is effective at preventing dental disease (Tickle et al., 2003).

- A study of 17,256 children in East Tennessee published in 2001 found that water fluoridation was significantly related to a reduction in dental caries experience of children. Adjusting the data for socioeconomic status, race, and age, researchers determined that caries levels were 21 percent lower in primary teeth and 25 percent lower in permanent teeth of children in fluoridated communities than in nonfluoridated communities (Gillcrist et al., 2001).

- Data gathered from a random sample of 6,306 5 year-olds in Ireland and analyzed using multivariate logistic regression analysis showed that water fluoridation status was among the variables most significantly associated with the presence of caries. Researchers concluded that the prevalence of dental caries among study subjects was higher among those residing in non-fluoridated communities than those in fluoridated communities (Creedon et al., 2001).

- An ecologic assessment of dental outcomes of surveys conducted in 1998 and 2002 of 9,327 and 5,722 (respectively) 12-year-old schoolchildren in towns of the state of Sao Paolo, Brazil revealed that an improved profile of socio-economic standings, preventive dental treatment, access to fluoridated tap water, and initiatives of dental education were significantly associated with reduced levels of caries distribution. These observations led the researchers to conclude that further reduction in caries levels could be achieved by targeting the expansion of dental services and access to fluoridated water to groups and areas with higher levels of needs (Antunes, et al., 2004).

- Examination of 544 12- to 15-year-old schoolchildren from five villages in the Davangere region of India with natural fluoride levels ranging from 0.43 ppm to 3.41 ppm showed a highly significant negative correlation between water fluoride levels and dental caries (Acharya 2005).

- Although a study of 1,104 children in Saudi Arabia did not reveal a direct linear correlation between water fluoride level and caries experience, researchers did find the lowest prevalence of dental caries among children drinking "optimum levels" of fluoride (.61-.80 ppm) (Al Dosari et al., 2004).

- A study of 1,020 12-year-olds in Pakistan was designed to replicate Dean's pioneering 1942 study of 12-year-olds in the United States. This study similarly revealed a distinct downward trend of dental caries with an increase of fluoride concentration of drinking water. However, the "optimum" fluoride concentration in Pakistan was found to be 0.33 ppm, leading the researchers to remark that there are no "gold standards" for establishing a universal optimal level of fluoride in drinking water (Khan et al., 2004).

Several studies in recent years have reported similar results among adults. A cross-sectional study of 973 Australian Army recruits published in 2005 found that lifetime exposure to fluoridated drinking water appreciably reduced subjects' incidence of caries compared with subjects with no exposure to fluoridated drinking water (Hopcraft et al., 2005). These results reinforced the findings of a study published in 2003 of 499 Australian Army recruits that determined that subjects with a lifetime exposure to fluoridated water had a 23 percent lower level of caries experience than subjects with no exposure to fluoridated water (Hopcraft et al., 2003). Researchers who studied residents in China (Wang et al., 2004) and India (Acharya et al., 2003) also concluded that a reduction in dental caries was associated with drinking fluoridated water.

Five studies that did not find an independent relationship between fluoridated water and reduced risk of dental caries were not conducted in the United States, and their results do not suggest that appropriately fluoridated water would not reduce caries incidence for much of this country's population. Two studies attributed the lack of an independent effect of fluoridated water to the widespread use of high-quality preventive dental care in the communities studied. One of these studies employed longitudinal data from the public health records of 1,503 subjects in a fluoridated and a low-fluoride community in Finland, and did not find a lower caries occurrence in the community with higher fluoride levels. The researchers attributed this result to intense efforts to promote – and the widespread use of – other measures for caries prevention, and concluded that the children had been exposed to such intense efforts to increase tooth resistance that the effect of water fluoridation does not show up any more. The researchers cautioned that the results must not be extrapolated to countries with less intensive preventive dental care, and noted specifically that significant differences in caries levels still exist in the United Kingdom and the United States between fluoridated and nonfluoridated areas (Seppä et al. 2002). The second study, in British Columbia, Canada, found that the prevalence of caries had decreased among 5,927 children living in an area where fluoridation had ceased three years before, whereas the prevalence of caries remained unchanged among children living in community that remained fluoridated. Researchers concluded that the availability of multiple sources of fluoride besides water fluoridation made it more difficult to detect changes among a population with generally low caries experience and living in an affluent setting with widely accessible dental services (Maupome et al., 2001).

Two other studies examined African populations and compared caries incidence in areas with naturally fluoridated water at very high concentrations with that in low fluoride areas. Grobler et al. (2001) examined caries experience in relation to three different drinking water fluoride levels in South Africa, and found a significantly higher caries experience in the community whose water naturally contained 3.0 ppm fluoride compared to that in communities drinking water with 0.48 and 0.19 ppm fluoride. Awadia, et al. (2002) found similar results in a study of 256 Tanzanian children, where subjects consuming water with 3.6 mg/L fluoride were

found to be at a significantly higher risk of dental caries than children in areas consuming water with <0.4 mg/L fluoride. Finally, a cross-sectional study of 523 Iranian schoolchildren aged 6 and 9 years living in three areas of the country with different natural fluoride levels could not confirm any obvious benefits of water fluoridation (Meyer-Lueckel et al., 2006). However, the researchers stated that their observations might be explained by differences in socioeconomic backgrounds, diet, other sources of fluoride, and varying urbanization, which were not accounted for in the study. These studies do not conflict with the overwhelming body of literature finding reduced caries prevalence when water is fluoridated at concentrations greater than 0.6 and up to 1.0 mg/L fluoride, the levels required for bottled water products to be eligible to bear this FDAMA health claim.

In sum, research over the past five years is consistent with, and has strengthened, the conclusions of the four sources of authoritative statements supporting this Notification that drinking fluoridated water reduces the risk of dental caries (tooth decay). Additionally, recent review articles continue to affirm the relationship between appropriately fluoridated water and caries prevention.[172] The vast number and broad diversity of studies conducted since the relationship between fluoridated water and reduced risk of dental caries was first discovered, coupled with the dearth of studies undermining this correlation, demonstrate that the benefit of fluoridated water on dental caries experience is supported by significant scientific agreement both domestically and internationally.

VIII. Additional Support for the Claim from Public and Dental Health Authorities

Public and dental health authorities around the globe have affirmed the relationship between fluoridated water and reduced risk of dental caries, demonstrating the universal agreement that this relationship is valid. Moreover, many such authorities have expressed concern that currently increasing levels of bottled water consumption may reverse the substantial dental health gains that have been achieved through community water fluoridation. The positions of these authorities support the instant health claim regarding fluoridated water and reduced risk of dental caries, and emphasize the importance of conveying this relationship to consumers through product labeling.

A. Additional United States Government Authorities

In addition to the four sources of authoritative statements forming the foundation of this petition, numerous other United States government authorities have affirmed that drinking fluoridated water reduces the risk of dental caries (tooth decay), and have encouraged the continued fluoridation of drinking water. Some have also expressed concern that the growing trend toward consumption of bottled water could have a negative impact on dental health.

The 2005 Dietary Guidelines for Americans ("Dietary Guidelines"), put out jointly by the U.S. Department of Health and Human Services and the U.S. Department of

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[172] *See, e.g.*, Featherstone, JDB. The Caries Balance: Contributing Factors and Early Detection. J Cal Dent Assoc 2003; 31(2):129-133.

Agriculture, address the issue of fluoridated water in the chapter on carbohydrates. The Dietary Guidelines explain:

> Sugars and starches contribute to dental caries by providing substrate for bacterial fermentation in the mouth. Thus, the frequency and duration of consumption of starches and sugars can be important factors because they increase exposure to cariogenic substrates. Drinking fluoridated water and/or using fluoride-containing dental hygiene products help reduce the risk of dental caries. Most bottled water is not fluoridated. With the increase in consumption of bottled water, there is concern that Americans may not be getting enough fluoride for maintenance of oral health. A combined approach of reducing the frequency and duration of exposure to fermentable carbohydrate intake and optimizing oral hygiene practices, such as drinking fluoridated water and brushing and flossing teeth, is the most effective way to reduce incidence of dental caries.[173]

The instant health claim would address the concern expressed in the Dietary Guidelines that Americans drinking bottled water may not get enough fluoride for maintenance of oral health, by informing consumers of the important oral health benefit of fluoridated water and highlighting in the marketplace which bottled waters are appropriately fluoridated.

U.S. EPA regulations, while focused on maximum contaminant levels to assure no adverse health effects, also acknowledge the dental health benefit of fluoridated drinking water, describing fluoride as a "water additive which promotes strong teeth."[174] Other federal agencies affirming the benefit of fluoridated water include the National Institute of Dental and Craniofacial Research and the National Cancer Institute.[175] Additionally, numerous state health programs have also emphasized the dental health benefit of water fluoridation.[176]

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[173] Dietary Guidelines, *supra* note 7, at 37.

[174] 40 C.F.R. Part 141, Subpt. O, App. A.

[175] *See* CDC web page providing links to various agencies and organizations recognizing the benefits of fluoridated water, available at http://www.cdc.gov/OralHealth/waterfluoridation/links.htm. The recent Congressional Research Service Report for Congress on issues relating to fluoride in drinking water also recognized that "many public health professionals and government officials believe that water fluoridation offers the most equitable and cost-effective way to protect dental health across socially and economically diverse communities." Mary Tiemann, Cong. Res. Serv., Fluoride in Drinking Water: A Review of Fluoridation and Regulation Issues (2006), at 13.

[176] *See id.*

B. International Health and Dental Organizations

The WHO has addressed the importance of fluoridated water in preventing dental caries in a number of documents and venues. In its Report on Fluorides and Oral Health, WHO acknowledges the extensive evidence from across the globe demonstrating the relationship between fluoridated water and reduced risk of dental caries (tooth decay):

> The first studies linking the fluoride content of drinking-water with reduced caries prevalence appeared in the 1930s, and more than a hundred studies have been reported from many different countries over the past 40 years. These studies are remarkably consistent in demonstrating substantial reductions in caries prevalence as a result as a result of water fluoridation.[177]

WHO concludes in that document that "[c]ommunity water fluoridation is safe and cost-effective and should be introduced and maintained wherever socially acceptable and feasible.[178] Further, as noted in Section VI.B.2. of this Notification, WHO states in its background document for development of its Guidelines for Drinking-water Quality that fluoride in drinking water at concentrations of 0.5 to 2.0 mg/L provide pre- and post-eruptive protection against dental caries.[179] In a document prepared for World Water Day 2001, WHO emphasized that "[f]luoridation of water supplies, where possible, is the most effective public health measure for the prevention of dental decay," noting that people of all ages benefit from community water fluoridation.[180] WHO again affirmed that "[c]ommunity water fluoridation is effective in preventing dental caries in both children and adults" in its World Oral Health Report 2003.[181] Most recently, while reiterating that research has determined that water fluoridation and the use of fluoride toothpastes and mouthrinses significantly reduce the prevalence of dental caries, WHO asserted that water fluoridation, brings substantial advantages to public health.[182]

Other international health and dental organizations have also stressed the important role of fluoridated water in preventing dental caries, including the FDI World Dental

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[177] WHO, Fluorides and Oral Health, at 16.

[178] WHO, Fluorides and Oral Health, at 19.

[179] WHO, Fluoride in Drinking-water, at 5.

[180] World Health Organization, "World Water Day 2001: Oral Health," available at http://www.who.int/water_sanitation_health/oralhealth/en/, at 3.

[181] WHO, "The World Oral Health Report 2003," available at http://www.who.int/oral_health/media/en/orh_report03_en.pdf, at 16.

[182] Peterson PE, Lennon MA. Effective use of fluorides for the prevention of dental caries in the 21st century: the WHO approach. Community Dent Oral Epidemiol. 2004 Oct;32(5):319-21.

Federation, the Australian Dental Association, the British Fluoridation Society, and the South African Dental Association.[183]

C. Professional Organizations

Virtually all of the major dental and general health associations in the United States have emphasized the importance of fluoridated water in preventing dental caries. The American Dental Association's 2005 publication, "Fluoridation Facts," celebrates sixty years of water fluoridation, and affirms that "[c]ommunity water fluoridation is the single most effective public health measure to prevent tooth decay."[184] Significantly, as noted in footnote 7, *supra*, ADA has expressed serious concern about the rapidly growing consumption of bottled water, and warns that "[i]ndividuals who drink bottled water as their primary source of water could be missing the decay preventive effects of optimally fluoridated water available from their community water supply."[185]

The American Dietetic Association also published its position on the impact of fluoride and health last year.[186] It observed that nearly 100 national and international organizations recognize the public health benefits of community water fluoridation for preventing dental caries, and "strongly reaffirms its endorsement of the appropriate use of systemic and topical fluorides, including water fluoridation, at appropriate levels as an important public health measure throughout the life span."[187] The American Dietetic Association also put on its website "The Clear Facts on Bottled Water,"[188] where it acknowledged that some bottled water may not contain fluoride that is found in tap water. Because water is the best source of fluoride for most people, the American Dietetic Association warns that relying on inadequately fluoridated bottled water may compromise fluoride intake by consumers. It suggests as a possible solution that consumers buy bottled water that has added fluoride.[189] The proposed health claim would support this solution by making it easy for consumers to identify appropriately fluoridated bottled water and to understand its importance in the diet.

The American Academy of Pediatric Dentistry ("AAPD") also states in its Policy Statement on the Use of Fluoride that the "AAPD endorses and encourages the adjustment of

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[183] *See* CDC web page providing links to international agencies and organizations recognizing the benefits of fluoridated water, available at http://www.cdc.gov/OralHealth/waterfluoridation/links.htm.

[184] ADA Fluoridation Facts, at 1.

[185] ADA Fluoridation Facts, at 19, 20.

[186] Position of the American Dietetic Association: The Impact of Fluoride on Health. J Am Diet Assoc. 2005;105:1620-1628.

[187] *Id.* at 1620.

[188] American Dietetic Association, "The Clear Facts on Bottled Water" (December 29, 2004), available at http://www.eatright.org/cps/rde/xchg/ada/hs.xsl/home_4387_ENU_HTML.htm.

[189] *Id.*

fluoride content of domestic community water supplies where feasible."[190] Likewise, the American Medical Association policy on statewide fluoridation "urges state health departments to consider the value of requiring statewide fluoridation (preferably a comprehensive program of fluoridation of all public water supplies, where these are fluoride deficient), and to initiate such action as deemed appropriate."[191] Additionally, the Joint Public Information Committee of the American Society for Nutritional Sciences and the American Society for Clinical Nutrition Resolution on Fluoridation of Drinking Water declares that "fluoridation of community water supplies to an optimum level wherever the natural level is less than optimum is a safe, economical and effective measure to improve dental health by improving nutrition."[192]

These strong endorsements of the role of fluoridated water in reducing the risk of dental caries (tooth decay) provide additional support for this FDAMA health claim, and make clear that the authoritative statements upon which the claim is based are consonant with the positions of the major public and dental health policymakers on this issue.

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[190] American Academy of Pediatric Dentistry, Policy Statement on the Use of Fluoride, available at http://www.aapd.org/members/referencemanual/pdfs/Fluoride.pdf.

[191] AMA H-440.972 Statewide Fluoridation, available at http://www.ama-assn.org/apps/pf_new/pf_online?f_n=browse&doc=policyfiles/HnE/H-440.972.HTM.

[192] Resolution on Fluoridation of Drinking Water, Joint Public Information Committee of the American Society for Nutritional Sciences and the American Society for Clinical Nutrition, available at http://www.asns.org/fluoridation.html.

IX. Summary and Conclusion

This Notification details the virtually universal agreement, expressed in four separate authoritative statements of scientific bodies of the United States government and confirmed by scientific studies around the world for more than half a century, that drinking fluoridated water reduces the risk of dental caries (tooth decay). The strength of the evidence of this relationship is the foundation of sixty years of public health policy favoring community water fluoridation. The evidence applies equally to fluoridated bottled water and tap water. Given the serious concerns expressed recently among public health officials concerning the dental health risk presented by the widespread consumption of inadequately fluoridated bottled water, the public health would be well served by the FDAMA health claim, on appropriately fluoridated bottled water, stating that drinking fluoridated water reduces the risk of dental caries (tooth decay). Such a claim would help educate consumers concerning the dental health benefit of fluoridated water consumption, and encourage the consumption of appropriately fluoridated bottled water consistent with healthy dietary practices.

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Attachments

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