Question of the Month

ADVICE FOR SMALL SYSTEMS

What Should We Tell Our Customers About Fluoride?

BY PAT KLINE

QUESTION: My plant has added fluoride to its water since the mid-1970s, but recently, a few customers have complained about this practice. They talk about fluoride as if it were some sort of poison, instead of an aid to fight cavities. What should we tell them?

ANSWER: Let's talk about what fluoride is, why many utilities add it to their public water supplies, and why some customers question this practice. Many water sources contain natural fluoride. Some, however, are low in fluoride content—perhaps because the reservoir or ground doesn't comprise the minerals that may erode to produce fluoride in water.

A HISTORICAL PERSPECTIVE

In 1908, a dentist named Dr. Frederick McKay became interested in the lack of dental caries (more commonly known to nondentists as "cavities") in his Colorado Springs, Colo., patients. Although his patients seemed to get cavities less frequently than others, some of them had teeth that were discolored, mottled, or spotted. After a lot of research, fluoride was determined to be the reason for the lack of cavities and also the cause of tooth discoloration, or enamel fluorosis. The optimum level of fluoride in water to prevent cavities without causing discoloration in most of the population was determined to be between 0.7 mg/L and 1.2 mg/L.

In 1962, the US Public Health Service endorsed the practice of drinking water fluoridation at doses of 0.7 mg/L in warmer climates and 1.2 mg/L in colder climates. The variation in fluoride concentration was based on the assumption that people in warmer climates drink more water, and therefore receive more fluoride. The basis of this endorsement was strictly the protection of the public from dental caries. There was no legal mechanism in place at that time to require removal of excess fluoride from drinking water.

Since 1974, the US Environmental Protection Agency has regulated drinking water through the Safe Drinking Water Act. For fluoride, the current maximum contaminant level goal (MCLG), which represents a nonenforceable contaminant concentration protective of health, and the maximum contaminant level (MCL), which represents a contaminant concentration that is technologically achievable, are the same: 4.0 mg/L. There's also a secondary MCL for fluoride of 2.0 mg/L. Secondary MCLs aren't enforceable, but USEPA intends them to prevent adverse aesthetic effects, like taste and odor, that are more subjective in nature.

PRACTICAL CONCERNS

So far this practice seems like a no-brainer. After all, extreme doses of most things can harm people: for example, too much ice cream makes you fat; too little ice cream makes you cranky. Everything in moderation, in other words. However, there are several concerns that some people have about water fluoridation, and those questioning you about the practice may mention one or more of them. Knowing the concerns, whether they seem logical or not, should help you address them if necessary.

In 1962, the US Public Health Service considered severe enamel fluorosis to be "cosmetic" in nature—not a health risk. A "health risk" in dental terms might be characterized as tooth loss or loss of tooth function. Some dentists now believe that severe enamel fluorosis should be treated to prevent the accumulation of bacteria, plaque, and food particles in the enamel. The question is whether enamel fluorosis, if untreated, would lead to the formation of cavities, which in turn could result in tooth loss or loss of function. As yet, much more research needs to be done to establish any direct link.

Children are the ones most likely to be affected by fluoride consumption because their teeth are still developing. About 10 percent of children who live in communities where the fluoride concentration in drinking water is around 4.0 mg/L exhibit severe enamel fluorosis. In the United States, about 200,000 people live in communities with fluoride levels at or above 4.0 mg/L. Around 25 percent of the US population is under 18, so it seems to be a pretty safe assumption that if 25 percent, or 50,000, of the people in communities with fluoride levels at or above 4.0 mg/L are children, 10 percent, or 5,000, of them would exhibit severe enamel fluorosis. That's 5,000 out of a total US population of more than 302 million, which isn't a statistically significant percentage.

The fluoride MCLG under the Safe Drinking Water Act pertains to the removal of excess fluoride from water to prevent skeletal fluorosis, a bone and joint condition associated with prolonged exposure to high levels of fluoride. The current MCLG was adopted to protect the general public from Stage III skeletal fluorosis, characterized by alterations in bone structure, such as osteoporosis, and tissue calcification that can limit an individual's range of motion. Stage III skeletal fluorosis is a rare condition in the US, so the MCLG appears to be working. However, USEPA is conducting additional research to determine if the MCLG protects the public from Stage II skeletal fluorosis. Individuals with this condition may have chronic joint pain and arthritic symptoms.

Less common are the folks who insist that adding fluoride, which they think of as a "chemical," to water is a form of

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mind control, unauthorized medication, systematic poisoning (because much of the silicofluorides used to fluoridate water are by-products of phosphate fertilizer production, some people believe that the silicofluorides contain fertilizer components or other contaminants), or some even more nefarious government plot. To answer these concerns, the fluoride used in water treatment should be certified as suitable for contact with drinking water in accordance with NSF/ANSI 60: *Drinking Water Treatment Chemicals—Health Effects* and "should not contain soluble or organic substances in quantities capable of producing deleterious or injurious effects on the health of those consuming water that has been treated properly… ."

AWWA supports fluoridation, as detailed in the AWWA Policy Statement below. In 1999, the Centers for Disease Control included water fluoridation in its list of the 10 greatest public health achievements of the 20th century. As someone who has drunk fluoridated water and been cavity-free for more than 35 years, I'd have to agree!

AWWA Policy Statement

Fluoridation of Public Water Supplies

Adopted by the Board of Directors Jan. 25, 1976; reaffirmed Jan. 31, 1982; revised Jan. 20, 2002; and revised Jan. 21, 2007.

AWWA supports the recommendations of the World Health Organization (WHO), American Medical Association (AMA), Canadian Medical Association (CMA), Centers for Disease Control (CDC), American Dental Association (ADA), Canadian Dental Association (CDA), and other professional organizations in the medical community for the fluoridation of public water supplies as a significant public health benefit. AWWA supports the application of fluoride in a safe, effective, and reliable manner that includes adequate monitoring and control of fluoride levels within limits mandated by provincial, state, and federal laws and that is subject to community acceptance through applicable local decision-making processes.