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# **Municipal Water Fluoridation: Recommendation for Durham City Council**

**June 2013**

**Developed by  
Durham County Board of Health**

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## Durham County Board of Health 2013

<b>Member</b>	<b>Statutory Position</b>	<b>Term Expires</b>
F. Vincent Allison, III, DDS	Dentist	January 2014
Stacy Jill Bryant, OD, F.A.A.C.	Optometrist	January 2014
Heidi Carter, MSPH	Public Member in Engineer Position	January 2015
Michael Case	Public Member	January 2016
John T. Daniel, Jr., MD	Physician	January 2016
Stephen Dedrick, RPh., MS	Pharmacist	January 2015
Brenda Howerton	County Commissioner	December 2013
Teme Levbarg, PhD, MSW	Public Member (Vice Chair)	January 2016
James M. Miller, DVM	Veterinarian (Chair)	January 2014
Nancy Short, DrPH, MBA, BSN	Nurse	January 2014
Bergen Watterson, MSCP, BA	Public Member	January 2016

## Acknowledgements

This report, Municipal Water Fluoridation: Recommendation for Durham City Council, documents the deliberations of the Durham County Board of Health to arrive at a recommendation on fluoridation of Durham's municipal water supply. The Board of Health appointed a subcommittee that organized and guided the process. The Board of Health received, reviewed, discussed and considered research, literature, presentations, input, assistance and feedback on fluoridation of drinking water. Board of Health meetings also included public comments and presentations from local citizens and professionals in the fields of medicine, dentistry, hydrogeology and water management, including UNC School of Pediatric Dentistry; NCDENR Division of Water Quality, Aquifer Protection Section; Department of Water Management, City of Durham; Oral Health Section, NC Division of Public Health; and Office of State Health Director, NC Division of Public Health.

Members of the Board of Health fluoridation subcommittee were James Miller, DVM; Vincent Allison, III, DDS; Nancy Short, DrPH, MBA, BSN; Teme Levbarg, PhD, MSW. Durham County Department of Public Health staff to the subcommittee were Gayle Harris, MPH, Public Health Director; Rebecca Freeman, MPH, RD, LDN, Assistant Public Health Director; Miriam McIntosh, DDS, MPH, Dental Practice Director; James Harris, PhD, Dental Division Director.

## Executive Summary

On March 14, 2013, the Durham County Department of Public Health (DCoDPH) hosted a discussion on fluoride and fluoridation of the municipal water in Durham by a panel that consisted of the Assistant Director for the City of Durham Department of Water Management; a Hydrogeologist with the North Carolina Department of Environment and Natural Resources (NCDENR), Division of Water Quality, Aquifer Protection Section; Chief of the Oral Health Section in the Division of Public Health; and Chair of the UNC-CH School of Dentistry Department of Pediatric Dentistry. This panel discussion was coordinated by an ad hoc committee set up by the DCoDPH Board of Health to gather information regarding the pros and cons of fluoridation of drinking water. This information would be utilized by the Durham County Board of Health in formulating a recommendation to be considered by the Durham City Council at their request. The Durham City Council is seeking to address complaints made by a citizen of Durham that fluoride is harmful to our health and therefore fluoridation of drinking water should be discontinued.

Members of the panel and literature reviewing sound scientific research about fluoride, standards for fluoride in drinking water and the importance of fluoridating community water state that community water fluoridation is one of ten great public health achievements of the 20<sup>th</sup> century and the single most effective public health measure to prevent dental decay.<sup>(1,2,3,4,5)</sup> Furthermore, research has been reported in the literature for more than 65 years that shows community fluoridation within the proper range is safe for our health and effective in reducing tooth decay. Although fluoride is considered safe, there is the chance of one risk that has been documented in research and that is dental fluorosis, a condition that causes staining and sometimes pitting of the enamel of teeth.<sup>(6,7)</sup> Dental fluorosis is observed to occur in some children in areas where there is a higher level of naturally occurring fluoride in well water (from the geological composition of soils and bedrock) than the maximum level needed to reduce tooth decay (4 parts per million) during their developing years (younger than 8 years of age). Unusually high levels of fluoride may also result from ingestion of fluoride from a combination of sources.<sup>(7)</sup> Fluorosis may occur with any combination of natural or community fluoridated water, plus the ingestion of fluoride tablets, and/or the ingestion of large amounts of fluoridated toothpaste that commonly happens when children are not supervised closely to limit the amount of fluoride products they use.<sup>(3,4)</sup> Dental fluorosis ranges in appearance from white spots on the enamel of teeth to pitting and brown stains on the enamel.<sup>(3,4)</sup> Researchers see this as a cosmetic effect – not an adverse effect on health, such as pain and/or infection.

In addition to fluorosis observed in dental enamel when high levels of fluoride are ingested, opponents to fluoridation of municipal water claim fluoride causes damage to the brain (lowering

the IQ of children), skeletal, endocrine, and immune systems, as well as contributing to bone and liver cancer.<sup>(4,5)</sup> Opponents also contend that community water fluoridation violates the principle of informed consent or is involuntary medication. The Environmental Protection Agency (EPA) monitors fluoride levels in drinking water (as it does other additives or elements naturally occurring in drinking water) and not the Federal Drug Administration, because fluoride is an element, not a food or drug.<sup>(4)</sup> Scientific evidence over the past 60 years has shown the allegations made by opponents of community water fluoridation to be misinterpretations that have taken sound scientific findings out of context and/or they are reports of research not supported by valid scientific institutions or review processes.<sup>(3,4)</sup> The EPA and the National Health and Medical Research Council (NHMRC) reviews confirm that reports of cases showing adverse effects of drinking water containing fluoride, like the Harvard study,<sup>(8)</sup> occur in areas where there are very high levels of fluoride in the drinking water.<sup>(5,6)</sup> Both reviews report that the research the opposition states to support their claims were often conducted in areas such as China, the African Rift system (from Jordan in northern Africa to Kenya and Tanzania in east Africa), some tracts of the Middle East, and the Indian sub-continent where inhabitants were exposed to extremely high levels of naturally occurring fluoride.<sup>(5)</sup> In many of these areas, 8 mg/L of fluoride were detected and as much as 2800 mg/L has been found at Lake Nakuru in Kenya.

In a report by the World Health Organization on naturally occurring hazards,<sup>(9)</sup> natural elements found in water are reviewed and include, in addition to fluoride, calcium, magnesium, copper, aluminum, sodium salts, uranium, radon, and arsenic. The report states that water gathers these elements from the rocks and ground through which it permeates. Furthermore, the reports states that at high levels, all of these elements pose a potential health hazard. Water treatment by water management companies can reduce the levels to beneficial or levels that do not pose a health hazard. Material Safety Data Sheets for supplements including fluoride added to foods, show all of them can pose health hazards at doses higher than those recommended.

All ground and surface water in the United States contains some naturally occurring fluoride. There are areas in the United States where the ground water contains higher than optimal levels of naturally occurring fluoride. Under the Safe Drinking Water Act, the EPA has established drinking water standards for a number of substances, including fluoride, in order to protect the public's health.<sup>(6,10)</sup> In cases where the naturally occurring level of fluoride in drinking water exceeds that level, the water supplier is required to lower the level to the appropriate range. (Common methods to remove fluoride are distillation or reverse osmosis).<sup>(4)</sup> Fluoride is added only to water that has naturally occurring levels lower than what is considered the optimum amount. Nearly all supplies that are put into drinking water (more than 40 items are typically used) must undergo various water treatment processes to be safe and suitable for human consumption.<sup>(6,7,9)</sup> Under the Safe Drinking Water Act (SDWA) the EPA must periodically review the existing National Primary Water Regulations at least every 6 years, which is a routine part of the EPA's operations dictated by SDWA to keep the regulations in line with current

changes in fluoride exposure (products used by citizens that contain fluoride such as toothpaste, mouth rinses, food, and beverages).

In 2003, fluoride was one of the chemicals reviewed by the EPA.<sup>(11)</sup> The EPA determined that a revision of fluoride usage levels was not appropriate at that time. In view of the additional exposure Americans now have to orally ingested fluoride by consuming products containing fluoride such as foods, toothpaste, mouth rinses, etc., the National Research Council's Subcommittee on Fluoride in Drinking Water conducted a review in 2010. The US Department of Health and Human Services (US-DHHS) recommended in 2011, on the basis of this assessment, that the optimal dose of fluoride added to water for the prevention of tooth decay be 0.7 mg/L.<sup>(6)</sup> This recommendation was made to promote public health benefits of fluoride for preventing tooth decay while minimizing the chance for dental fluorosis. Durham City Department of Water Management currently maintains the dosage of fluoride at 0.7 mg/L (0.7 parts/million) with daily testing. In addition, information about the water treatment process in Durham is made available to the citizens in Durham on their website and annually by mail (panelist).

The American Dental Association, the US Department of Health and Human Services-Center for Disease Control and Prevention (CDC), the US Public Health Service, the American Medical Association, the World Health Organization, the Institute of Medicine-Food and Nutrition Board, the National Research Council, the American Academy of Pediatrics, as well as several other nationally recognized organizations, support community water fluoridation. Community water fluoridation has been found to be the most effective public health measure to prevent dental decay for children and adults, reduce oral health disparities and improve oral health. In addition, it is the most cost effective measure to reduce tooth decay; the cost of community water fluoridation is \$1 for every \$38 spent on dental treatment.<sup>(12)</sup> Fluoridating water is similar to fortifying salt with iodine, milk with vitamin D, orange juice with calcium and bread with folic acid to improve health outcomes of all citizens in the community.

Via a letter to the April 2013 National Oral Health Conference, US Surgeon General Dr. Regina Benjamin stated, "One of water fluoridation's biggest advantages is that it benefits all residents of a community...". "Fluoridation's effectiveness in preventing tooth decay is not limited to children, but extends throughout life, resulting in fewer and less severe cavities."<sup>(13)</sup> In her letter, she also referenced comments by Surgeon General Dr. David Satcher in his *Oral Health in America: A Report of the Surgeon General* (2000) where Dr. Satcher stated "community water fluoridation continues to be the most cost-effective and practical way to provide protection from tooth decay in a community." Other former Surgeon Generals have supported community fluoridation as well.<sup>(4)</sup> Former Surgeon General Dr. Luther Terry is reported to have called fluoridation as vital a public health measure as immunization against disease, pasteurization of milk and purification of water. Former Surgeon General Dr. C. Everett Koop stated, "Fluoridation is the single most important commitment that a community can make to the oral health of citizens." Additionally, in the *2003 National Call to Action to Promote Oral Health*,



then US Surgeon General Carmona called on policymakers, community leaders, private industry, health professionals, the media, and the public to affirm that oral health is essential to general health and well-being.

In a letter to the DCoDPH Board of Health, Dr. Laura Gerald, North Carolina's State Health Director, stated, "for more than 65 years the safety of community water fluoridation has been studied and confirmed as being safe and the most cost effective preventative measure that can be taken to reduce tooth decay in people of all ages." She stated further, "North Carolina has supported the fluoridation of drinking water for over 65 years. Charlotte fluoridated its water supply in 1949 and at that time, was the largest water system in the world to adjust its fluoride level to the recommended optimal level." Dr. Gerald is a pediatrician with a Masters in Public Health from Harvard University and has learned first-hand about the number of children who suffer with tooth decay during the time she worked in a rural low-income county.

Fluoridated community water is considered by its supporters to be the most effective strategy because all residents in the community benefit from it, and the benefit is not dependent upon human behavior (individual frequency of use).<sup>(14)</sup> Also fluoridated water benefits low socioeconomic populations, where health disparities exist, since people in those populations cannot afford oral hygiene products to benefit from the fluoride in them nor do they have access (or have less access) to dental services. Communities benefit from fluoridated drinking water in that less money is spent on dental services in public health facilities which are funded by the general public. Currently, public health dental services are stretched beyond their limits, due to the lack of resources needed to provide dental services to all individuals with dental problems that stem from tooth decay.

In addition to fluoride being reported to be non-toxic at low levels, it has also been reported to have a beneficial effect in reducing the amount of tooth decay.<sup>(15,6)</sup> Several reports on literature reviews and monitoring by the EPA show that 4 mg/L of fluoride is the maximum level that should be added to drinking water to greatly reduce the amount of tooth decay in a community without adverse effects on the health of individuals consuming the water, and that 0.7 to 1.2 mg/L is the minimum. The US-DHHS is recommending 0.7 mg/L as the optimum dose needed to prevent tooth decay and have the least adverse effect, if any, on health.<sup>(6)</sup>

Just as vitamin intake is recommended daily to maintain an optimum level of various vitamins continuously in our bodies, so must exposure to the optimum level of fluoride occur to prevent tooth decay and maintain good oral health. Sporadic/occasional intake is not effective. Forgetting or not having time to brush, toddlers who refuse to have their teeth brushed, and children who do not like to brush their teeth (just like they don't care to bathe) cross all socioeconomic levels in communities. Fluoridating community water is the most effective way to assure all citizens are exposed to the recommended or optimum level of fluoride to reduce the occurrence of tooth decay, yet will have no adverse effect on the health of individuals and greatly reduce the cost of dental services needed to individuals as well as the healthcare system.

## **RECOMMENDATION FROM THE AD HOC COMMITTEE**

The Board of Health fluoridation subcommittee met on May 24, 2013 to consider all information, research, presentations, and public comments gathered on fluoridation of municipal water supplies. Based on research evidence and literature review as well as testimony from reputable panelists contained on this report, and considering public comments, the DCoDPH Ad Hoc Committee recommends to the Durham County Board of Health that fluoridation of Durham's municipal water supply be continued at the current levels, as deemed effective for prevention of tooth decay and for promotion of good oral health by the US-DHHS, Centers for Disease Control and Prevention.

## **RECOMMENDATION FROM THE DURHAM COUNTY BOARD OF HEALTH**

A regular session of the Durham County Board of Health was held on June 13, 2013. During the Committee Reports section of the agenda, Dr. F. Vincent Allison III read the above recommendation from the committee. The Board of Health voted unanimously to approve the committee's recommendation.

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<sup>1</sup> <http://www.fluoridescience.org>

<sup>2</sup> <http://www.cdc.gov/fluoridation>

<sup>3</sup> <http://www.apha.org/advocacy/policy/policysearch>

<sup>4</sup> [http://www.ada.org/sections/news/andevents/pdfs/fluoridation\\_facts](http://www.ada.org/sections/news/andevents/pdfs/fluoridation_facts)

<sup>5</sup> [http://www.nhmrc.gov.au/\\_files\\_nhmrc/publications](http://www.nhmrc.gov.au/_files_nhmrc/publications)

<sup>6</sup> <http://yosemite.epa.gov/opa/admpress>

<sup>7</sup> National Research Council of the National Academies, A Scientific Review of EPA's Standards: Fluoride In Drinking Water. 2006. The Academic Press, Washington. DC.

<sup>8</sup> Choi AL, Sun G, Zhang Y, and Grandjean 2012. Developmental Fluoride Neurotoxicity: A Systematic Review and Meta Analysis. Environmental Health Perspectives 120(10):1362-1368.

<sup>9</sup> [http://www.who.int/water\\_sanitation\\_health/naturalhazards/](http://www.who.int/water_sanitation_health/naturalhazards/)

<sup>10</sup> <http://water.epa.gov/drink/standards/hascience>

<sup>11</sup> <http://water.epa.gov/drink/contaminants/basicinformation/fluoride>.

<sup>12</sup> Griffin, SO., Jones, K., Tomar, S.L., 2001. An Economic Evaluation of Community Water Fluoridation. J Public Health Dent, 61 (2):78-86.

<sup>13</sup> <http://www.ada.org/news>

<sup>14</sup> ADA Fluoridation Facts Compendium. Available at ADA.org

<sup>15</sup> <http://water.epa.gov/action/advisories/drinking/upload/dwstandards2012>

## **Background**

On October 1, 2011, Corey Sturmer submitted a request to appear before the City Council during a Council Work Session on December 21, [2011] indicating the subject would be "Water Supply and Fluoride." His message was stated as "I wish to present evidence that sodium fluoride, a chemical regularly added to our water supply, causes neurological damage, cancer, poor bone health, and possible death among other ailments. I [want] to convince the city council to take action to eliminate the addition of this additive to our water."

On February 28, 2012, Corey Sturmer submitted a request to appear before the City Council on March 8, 2012, to talk about fluoride. His documented summary of his presentation stated "I wish to restate my concern for the addition of Fluoride to Durham's drinking water. I have produced conclusive proof of [its] detrimental nature to our bone density, IQ and dental health and would like to ask the city council to take immediate action to remove this additive to our water."

On March 15, 2012, Mr. Sturmer submitted a request to appear before the City Council during a regular meeting session to provide comments regarding the addition of fluoride to Durham's drinking water.

On July 12, 2012, Mr. Sturmer sent an e-mail to Vicki Westbrook and copied Don Greeley, Assistant Director and Director of Water Management Department, City of Durham. The subject of the message was "Durham Guinea Pig Reports; Duke University study links fluoridation with dental damage." He commented in the e-mail message "...Ironically, the city of Durham's own Duke University in conjunction with Professor Brian A Burt conducted a study when this writer was living in Durham at the age of 4-5 years. The study involved the city turning off public water fluoridation for a period of 11 months during 1990-1991, whilst observing the incisor changes in over 1800 K-5 aged children in Durham, NC." (See Attachment 23, 24)

On July 25, 2012, Mr. Sturmer e-mailed Councilman Steve Schewel and copied the Mayor and other Council members to share news article titled "Harvard Study Finds Fluoride Lowers IQ" published online July 20, 2012 in Environmental Health Perspectives.

On August 15, 2012, Mr. Sturmer sent an e-mail to Mayor Bell and copied to all members of the City Council and "Water Management Employees"— Don Greeley and Vicki Westbrook with a subject of "NOTIFICATION: WTVD Channel 11 interested in public water fluoridation dangers." (See Attachment 2) The body of the message began with the following wording and format:

"Durham City Council Members & City Water Department Employees,

**You are being put on *notice* that the unhealthy and unethical practice of fluoridating our public drinking water now has the attention of local media. Public awareness of this has shifted greatly since the July 24 Harvard Study was released which showed Fluoride reduces intelligence quotient for children and adults.**

**Steve Daniels of WTVD Channel 11 Eyewitness news is now in detailed talks with myself, educators, parents, and dentists who are staunchly AGAINST the practice of fluoridating our public drinking water."**

This e-mail message also contains several e-mail exchanges between Mr. Sturmer and Steve Daniels, Evening News Anchor ABC11 News Department from July 13, 2012 and August 15, 2012.

On August 17, 2012, Mayor Bell responded to Mr. Sturmer's message with the following reply: "Thanks for your email and sharing your information and concerns with me/the city council/etc. I am requesting my staff to refer your email to Ms. Gayle Harris (Durham County Health Director) and the Chair of the Board of Health." That same day, the e-mail was sent to Gayle Harris by Evelyn Wright-Corbett, Administrative Coordinator Mayor's Office. A follow-up telephone call with Ms. Wright-Corbett clarified that the Mayor would like for the Board of Health to make a recommendation to him and the City Council regarding fluoride in Durham's municipal water supply.

Mr. Sturmer contacted Ms. Harris to schedule a meeting to discuss his concerns. He met with the Ms. Harris and Ms. Sue McLaurin, Board of Health Chair on August 23, 2012. During that meeting, he was advised that he could provide public comments to the Board of Health at the September 13, 2012 meeting. After hearing from him, the Board of Health would determine a process for addressing his concerns.

On September 13, 2012, Mr. Sturmer, Charlee Eades, Kelly McMullen, Scott Boggs and Rachel Godfrey signed up to speak during the Public Comment period of the Board of Health meeting. Each speaker provided written information that included their comments and/or additional materials for the Board of Health to consider. [See Attachments 4a-4e(v)]

# Evaluation of Public Comments, Concerns, and Opposition

## ASSERTION 1: FLUORIDE HAS DAMAGING AFFECTS ON OUR PHYSIOLOGY

Public comments made asserted that studies exist which indicate fluoride damages the brain, causes gastrointestinal disorders, and cancer. Comments were made that fluoride in the water may not benefit teeth, and that it causes dental fluorosis – a visible sign of damage to the internal structure of the tooth.

### EVALUATION

Dr. Rebecca King, North Carolina State Public Health Dental Director, Chief of the Oral Health Section provided her professional opinion that, “more than 3,000 studies or research papers have been published on the subject of fluoridation,” meaning few topics have been as thoroughly researched as fluoride. CDC (Centers for Disease Control and Prevention) states that: ‘the weight of the peer-reviewed scientific evidence does not support an association between water fluoridation and any adverse health effect or systemic disorder.’ Leading health and medical organizations agree that there is “strong evidence that water fluoridation is both safe and effective.”

Dr. Timothy Wright, Professor and Chair at UNC-CH Department of Pediatric Dentistry stated that “If you go back in fluoride history, when it was discovered 100 years ago, it has been looked at as a great health benefactor. So what does the data suggest? It has accused fluoride and its derivatives, compounds of everything from down-syndrome to retardation, to osteosarcoma. So what are the facts?”

“Osteosarcoma was a condition where they looked at different communities with different water levels (of fluoride). It is one of the only preventive health measures tested at the community level. The initial trials in Grand Rapids Michigan, in 1945, involved a comparison of one community that was fluoridated and one that was not. This has been going on for over 65 years of water fluoridation in the United States. Concerns about osteosarcoma were big. There was a rat study, in RTP, that leaked some of the early information, before they had completed the trial data, that said there was evidence of high levels of osteosarcoma. They went back and analyzed all the data and it didn’t pan out. The most recent scare of that was in Dr. Douglas’s data from Harvard, where he was accused of hiding data. It appeared males were having a higher level of osteosarcoma, based on the epidemiological studies of humans. They went back and analyzed the data fully with other groups and it didn’t pan out. Osteosarcoma is extremely rare, and it

had an effect you would expect to see a massive population base with these kinds of fluoride effects.”

Concerning fluorosis, Dr. Wright explained, “Dental fluorosis occurs at the time of tooth development. So, we are looking at the young ages as being the most sensitive, especially for the anterior teeth, up to 8-9 years old. For the front teeth, it would be 1-3 years old. So, dental fluorosis can occur if you get too much, like from eating toothpaste, in our society, or on a well with too much, or inappropriately prescribed. So whatever the exposure was during that window (1-3 years old), depending on the dosage, the higher the dosage the worst the defect is. Basically the enamel is mineralizing as well as it should. Fluoride has a variety of activities on cells and cell systems and physiology at those higher levels...People with minimal fluorosis have lower levels of caries.”

Dr. King stated “So it’s like anything you want the proper levels, as far as discussion of fluorosis, there are some studies that say that changes in the fluoridation levels probably wouldn’t do much for fluorosis anyhow. As Dr. Wright mentioned, fluorosis comes from inappropriate use of toothpaste, little kids not being supervised and eating too much or kids getting a fluoride supplement when they are already on a community water system. So they are getting double the dosage of fluoride. We would expect there to be problems. It really is not so much related to the .7 part per million that is in water.” “I have had kids come see me and their teeth were dirty and we are talking about brushing their teeth and they would say ‘I couldn’t brush my teeth, because my brother ate the whole tub.’”

The Centers for Disease and Prevention August 17, 2001, report, *Recommendations for Using Fluoride to Prevent and Control Dental Caries in the United States*, states “Even in its severe form, enamel fluorosis is considered a cosmetic effect, not an adverse functional effect.”

## **CONCLUSION**

Based on extensive research that has been conducted on the impact of fluoride, there is strong evidence that water fluoridation is both safe and effective and does not cause brain damage, gastrointestinal disorders, and cancer. Dental fluorosis occurs during tooth development. Young children up to 8 to 9 years old are most susceptible to fluorosis, which is related more to inappropriate use of toothpaste (children not being supervised with toothpaste use) or getting a fluoride supplement when they are already on a fluoridated water supply. Severe enamel fluorosis is considered a cosmetic effect, not an adverse functional effect.

## Evaluation of Public Comments, Concerns, and Opposition

### ASSERTION 2: FLUORIDE IS A DANGEROUS CHEMICAL

During public comments, it was stated that the fluoride chemical used in Durham's municipal water supply is a HAZMAT Class 8 Corrosive Substance (which means it will burn a hole through all layers of your skin and beyond). It was also asserted that fluoride does not magically disappear at small doses in our water: it interferes with basic chemical processes in our cells and causes disease in our organ systems.

### EVALUATION

Amy Keyworth, Hydrogeologist, North Carolina Department of Environment and Natural Resources, Division of Water Quality, Aquifer Protection Section, explained that, "Fluoride is a naturally occurring ion of the element fluorine. It combines with many cations to form a variety of naturally occurring minerals such as calcium fluoride, sodium fluoride, aluminum fluoride, etc. Fluoride is found in groundwater in varying concentrations, depending on the local geology. Fluoride-bearing minerals are found in both igneous and sedimentary rocks."

"In Durham County, there are two primary geologic types – the Carolina Terrane to the north and west, and the Triassic Basin to the south and east. The Carolina Terrane is made up of rocks resulting from ancient, extinct volcanic activity. The Triassic Basin rocks are sedimentary rocks formed from the weathering and erosion of Carolina Terrane rocks. Both Carolina Terrane and Triassic Basin rocks contain some fluoride-bearing minerals."

Dr. Wright said that, "Fluoride is the 13<sup>th</sup> most common element in the earth's crust. It is a chemical, we are all chemicals."

"Why is it a fertilizer? The phosphate, when they dig for fertilizer to add the phosphate. When they mine the phosphate, one of the by-products of that is different fluoride rich, because it is the earth's crust. They are digging it up and getting the phosphates, so it is a by-product of that industry. It is only one of the things that is used in municipalities. When they say they are measuring fluoride ion, that is true, because when you put it into the water it dissolves. So you have the elements; the components of that. You will have sodium, silicate, and fluoride; and the fluoride is an ion. So you don't have fluorosilicic acid, but some actually use liquid feeders that are hydrofluoric acid... So yes, that is a true statement. It is a by-product of that."

"We have lots of by-products, such as penicillin. It's mold on bread, but how many lives have been saved by that. So you have to tease out what is the reality versus the emotional. It is very emotional to say it is a by-product and it sounds like a chemical name with acid in it and sounds terrible, but it disassociates the fluoride ion so what they are measuring is the disassociated ion. It is true that it is toxic, like most things if you have too much of it. It causes not only tooth problems, but systemic problems and if you take enough of it, it will kill you. Those are the truths as I see it, but at 0.7 parts per million, again these were studies done on humans from municipalities, with thousands of people drinking at these different levels. As you got close to part per million, you got the best bang for your buck with no deleterious effects of any kind, systemic or anything else."

## **CONCLUSION**

Effects of fluoride are related to the dosage consumed; if too much is ingested, it can be toxic. However, in maintaining the 0.7 parts per million standard in the water supply as currently practiced in Durham, fluoride provides a good benefit without harmful effects.



## **Evaluation of Public Comments, Concerns, and Opposition**

### **ASSERTION 3: RESEARCHERS AT HARVARD AND DUKE HAVE HIGHLIGHTED NEGATIVE IMPACT OF FLUORIDE IN WATER**

During public comments, it was asserted that Harvard released a study in 2012 with the quote, “Children in high fluoride areas had significantly lower IQ scores than those who lived in low fluoride areas. The results suggest that fluoride may be a developmental neurotoxicant that affects brain development at exposures much below those that can cause toxicity in adults.”

It was also noted that Duke conducted a study in the early 1990s related to the cessation of fluoridation in Durham’s municipal water source between September 1990 and August 1991. It was concluded that, “while the break had little effect on caries, dental fluorosis is sensitive to even small changes in fluoride exposure from drinking water, and this sensitivity is greater at 1-3 years of age than at 4 or 5 years.”

### **EVALUATION**

Dr. Timothy Wright stated that, “recent IQ data (from the Harvard Study) shows that they sampled communities in China and two communities in Iran. What they are comparing is called high fluoride levels, which are anywhere from 4-to-20 times above .7 mg/L levels that the United States would consider to be optimally fluoridated. In most of those communities—not all of them, but most of them—there is not a problem of lower IQ scores. So, the data overwhelmingly shows, in thousands of studies, that at the right level, fluoride is beneficial and safe.”

Dr. Wright continued, “Groups arguing against water fluoridation site information regarding the risks of fluoride, such as recent publications on children exposed to fluoride having lower IQ levels. In all of these study populations, the children studied were exposed to many times greater the optimal level of fluoride (sometimes as much as 20 times) and the normal comparison group was typically children with fluoride exposure levels similar to or even greater than those drinking Durham Country water. Providing water fluoridation in fluoride deficient communities has been present in the United States for over 60 years. It has been evaluated for safety on millions of people, and there remain no validated and scientifically supported harmful effects.”

In addition to Dr. Wrights comments on fluorosis (refer to assertion 1), Dr. King added that, “there are some studies that say that changes in the fluoridation levels probably wouldn’t do much for fluorosis anyhow. Fluorosis can come from inappropriate use of toothpaste, little kids

not being supervised and eating too much or kids getting a fluoride supplement when they are already on a community water system. So, they are getting double the dosage of fluoride. We would expect there to be problems. It really is not so much related to the .7 part per million that is in water.”

Jean Spratt, DDS, Oral Health Section, NC Division of Public Health commented in an email to Health Director Gayle Harris (Attachment 2) that the Harvard study (Attachment 2) is “not relevant to community water fluoridation as practiced in the U.S., which provides very small, carefully controlled adjustments to the amount of fluoride in the water.” Furthermore, the study “Dealt with areas in China and Iran, with very high levels of naturally occurring fluoride (much higher than used in community water fluoridation in the U.S.). Most anything in excess can harm someone’s health.” Additionally, the Harvard study, “Did not consider presence of other risks in the water, such as lead, arsenic. Community water fluoridation has been studied extensively for over 60 years and determined to be safe and effective.”

Regarding the cessation of water fluoridation in Durham between September 1990 and August 1991, Martha Ann Keels, PhD, DDS, Duke faculty, in an email to Health Director Gayle Harris, stated that “Durham had a ‘Break’ in the container that help fluoride at one of the plants (Williams I think) and the policy at the time was to turn OFF fluoride at the Brown Plant until the Williams Plant container could be fixed—which took almost a year.” Dr. Keels and Dr. Brian Burt were funded by NIH to study the effects of turning off fluoride in the water for almost a year. (Attachment 23) When asked if her findings suggest that fluoride should be removed from drinking water, Dr. Keels replied “No”.

## CONCLUSION

The study by Harvard was conducted in communities in China and Iran where fluoride levels were 4 – 20 times higher than the .7 parts per million in Durham’s municipal water supply. In addition, it is noted that not all subjects experienced lower IQ scores. The research serves to confirm that taken at the right levels, fluoride provides a good benefit.

As for the second part of this assertion focusing on dental fluorosis after an 11-month cessation of water fluoridation, one of the authors of the study, Dr. Keels, noted that there seemed to be a “HALO EFFECT OF FLUORIDE’ in the diet protecting the teeth despite the fact the city water was not fluoridated.” Furthermore, Dr. Keels recommends that water fluoridation should continue.

Dr. King noted that “changes in the fluoridation levels probably wouldn’t do much for fluorosis anyhow.” The panelists noted that fluorosis may result from inappropriate use of toothpaste,

children not being supervised and eating too much, or youth ingesting a fluoride supplement when they are already on a community water system. Dr. Wright also stated that, "Dental fluorosis occurs at the time of tooth development." Therefore, it appears that the .07 parts per million in Durham's water would not contribute to dental fluorosis, regardless of age.

## Evaluation of Public Comments, Concerns, and Opposition

### **ASSERTION 4: SCIENTIFIC STUDIES SHOW FLUORIDE IN WATER POSES RISK OF SERIOUS HARM**

In addition to assertions made on the physiological impacts of fluoride, public comments made note of the EPA's Headquarters Professionals' Union opposes water fluoridation based on scientific literature documenting the increasingly out-of-control exposure to fluoride, the lack of benefit to dental health from ingestion of fluoride, and the hazards to human health.

Comments also suggested the Centers for Disease Control and Prevention (CDC) National Health and Nutrition Examination Survey shows that in 25 of the 28 largest cities in the US, fluoride levels in tap water alone will put 8 – 36 percent of all babies up to 6 months of age over the safe dose of fluoride on any given day.

### **EVALUATION**

Per the Safe Drinking Water Act (1974), the EPA is required to determine the level of contaminants in drinking water at which no adverse health effects are likely to occur. These non-enforceable health goals, based solely on possible health risks and exposure over a lifetime with an adequate margin of safety, are called maximum contaminant level goals (MCLG). Contaminants are any physical, chemical, biological or radiological substances or matter in water. Referring to the January 7, 2011, *EPA News Releases – Water*, "HHS' proposed recommendation of 0.7 milligrams of fluoride per liter of water replaces the current recommended range of 0.7 to 1.2 milligrams. This updated recommendation is based on recent EPA and HHS scientific assessments to balance the benefits of preventing tooth decay while limiting any unwanted health effects." (Attachment 22)

Regarding the CDC, William Bailey, D.D.S., M.P.H., Acting Director, Division of Oral Health, National Center for Chronic Disease Prevention and Health Promotion: Centers for Disease Control and Prevention, provided a letter to the Durham County Department of Public Health on March 14, 2013, stating, "community water fluoridation has been shown to be effective in reducing the number and severity of cavities and is a major reason that Americans today have better overall dental health. Currently, more than 200 million people, or 73.9 percent of the U.S. population served by public water supplies, drink water with optimal fluoride levels to prevent tooth decay.

Water fluoridation is beneficial for reducing and controlling tooth decay and promoting oral health in children as well as adults. A review of the effectiveness of community water fluoridation conducted by the Task Force on Community Preventive Services found that when tooth decay rates were measured before and after water fluoridation, decay rates decreased by a median 29.1% among children ages 4 to 17 compared with control groups. Fluoridation was found to help decrease tooth decay both in communities with varying decay rates and among children of varying socioeconomic status."

## **CONCLUSION**

The EPA Headquarters Professionals' Union article is twelve years old and is not an endorsement of the Environmental Protection Agency itself. The recommendation of 0.7 mg/L of fluoride in water is based on EPA and HHS scientific assessments. Additionally, the Centers for Disease Control and Prevention (CDC) named community water fluoridation one of 10 great public health achievements of the 20th century.

## **Evaluation of Public Comments, Concerns, and Opposition**

### **ASSERTION 5: WATER FLUORIDATION VIOLATES THE PRINCIPLE OF INFORMED CONSENT**

Public comments made asserted that by adding fluoride to the public water supply Durham is denying all individuals the right to review the relevant scientific studies, consider their own physiological factors, and make informed decisions to accept or reject treatment of fluoridation. It was also stated that Durham is requiring citizens to spend approximately \$173,000 to purchase a product (hydrofluorosilicic acid) from a private industry.

### **EVALUATION**

Dr. King stated that, "Fluoride is not a medication. It is in there to prevent tooth decay. It's like vitamins. It is a preventive measure not a medicine".

Dr. Wright added that, "Fluoride is not only the 13<sup>th</sup> most common element in the crust, it is the most active element in the periodic table. It doesn't hang out, it bonds up with stuff, it's made in the earth's crust. It is the most reactive element in the earth's crust. Fluoride is not a drug. If you look up the definition of a drug or medication, it (fluoride) is not; it is an ion; it is an element. You are not medicating people when you chlorinate the water...This is another prevention measure that is accepted."

Gayle Harris, Health Director: Durham County Department of Public Health explained that, "The request for the Department to look into the issue of water fluoridation "came from Mayor Bell after he had several appearances from residents before the City Council about water fluoridation. In August, Mayor Bell asked that you (the Board) make a recommendation to the City Council about this issue.

Vicki Westbrook, Assistant Director, City of Durham, Department of Water Management, stated that "The total budget for 2012 for chemicals at the water treatment facilities was \$2.3 million; fluoride purchases (in the form of hydrofluorosilicic acid) comprise about 3% of the chemical budget or just under \$70,000."

### **CONCLUSION**

Durham has not denied individuals the right to review the relevant scientific studies, consider their own physiological factors, and make informed decisions to accept or reject treatment of fluoridation. Board of Health meetings are open to the public and each meeting offers a "Public Comments" opportunity. The Board of Health was asked to make a recommendation on the fluoridation of Durham's municipal water supply, not the cost.