



# **SOUTH CAROLINA COMMUNITY WATER FLUORIDATION PLAN**

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**STATE-BASED  
ORAL DISEASE PREVENTION PROGRAM**

**DIVISION OF ORAL HEALTH  
2013-2018**

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## FREQUENTLY USED ACROYNMS

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ADA	American Dental Association
ANSI	American National Standard Institute
AWWA	American Water Works Association
ASTDD	Association of State and Territorial Dental Directors
BOW	Bureau of Water
CDC	Centers for Disease Control and Prevention
CWF	Community Water Fluoridation
CWS	Community Water System
DHEC	Department of Health & Environmental Control
DHHS	Department of Health and Human Services
DOH	Division of Oral Health
EFIS	Environmental Facility Information System
EPA	Environmental Protection Agency
EQC	Environmental Quality Control
HRSA	Health Resources and Services Administration
IWP	Individual Work Plan
MCHB	Maternal Child Health Bureau
MCL	Maximum Contaminant Levels
NSF	National Sanitation Foundation
QAS	Quarterly Advisory Summit
RA	Recipient Activity
SCAC	South Carolina Association of Counties
SCDA	South Carolina Dental Association
SC DHEC	South Carolina Department of Health & Environmental Control
SCOHACC	South Carolina Oral Health Advisory Council and Coalition
SCRHRC	South Carolina Rural Health Research Center
SDWA	Safe Drinking Water Act
SDWIS	Safe Drinking Water Inventory System
SOHP	State Oral Health Plan
WFRS	Water Fluoridation Reporting System

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## **PURPOSE**

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The purpose of the SC DHEC Public Health Program Manual for Community Water Fluoridation is to provide internal agency personnel and external partners and stakeholders with the operation of the state-level program for community water fluoridation.

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## A. INTRODUCTION: COMMUNITY WATER FLUORIDATION

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### 1. Overview

Oral health is a key part of a person's overall health and well-being throughout life. Good oral health includes our ability to chew, swallow, smile, speak, learn and work. However, tooth decay, a common problem for people of all ages, can result in pain and suffering and reduced quality of life. Today we know that the damage caused by tooth decay can be reduced or in many cases prevented as a result of water fluoridation.

Fluorine is an abundant element in the earth's crust and it exists only as a fluoride compound. Fluoride compounds are components of minerals in rocks and soil. The result is that small amounts of fluoride are present in all water sources. Generally, in surface water sources such as lakes, rivers and streams there are very low levels of fluoride, while in ground water the levels of fluoride vary. Fluoride is naturally present to some extent in all foods and beverages, but the concentrations vary widely.

Although fluoride is present almost everywhere, it could be beneficial to the population's oral health only at a certain level of concentration. This level is proven to be at the 0.7 milligrams per liter (mg/L) or parts per million (ppm). Community water fluoridation (CWF) is the adjustment of the natural fluoride concentration in water up to the level recommended for optimal dental health at 0.7 mg/L. CWF is considered one of the 10 greatest public health achievements of the 20<sup>th</sup> century.

#### *a. Effectiveness*

Water fluoridation prevents tooth decay mainly by providing teeth with frequent contact with low levels of fluoride throughout each day and throughout life. Even today, with other available sources of fluoride, studies show that water fluoridation reduces tooth decay by about 25 percent over a person's lifetime. Evidence also shows that school children living in communities where water is fluoridated have, on average, 2.25 fewer decayed teeth compared to similar children not living in fluoridated communities.

This method of fluoride delivery benefits all people—regardless of age, income, education or socioeconomic status. A person's income and ability to get routine dental care are not barriers since all residents of a community can enjoy fluoride's protective benefits just by drinking tap water and consuming foods and beverages prepared with it.

Communities with fluoridated drinking water in the United States, Australia, Britain, Canada, Ireland and New Zealand have demonstrated striking reductions in tooth decay. Nearly all tooth decay can be prevented when fluoridation is combined with healthy eating and drinking, dental sealants and other fluoride products, such as toothpaste.

### ***b. Safety***

For many years, panels of experts from different health and scientific fields have provided strong evidence that water fluoridation is safe and effective. Benefits are provided over a lifetime. The dental health of adults as well as children is enhanced because of water fluoridation.

The weight of the peer-reviewed scientific evidence does not support an association between water fluoridation and any adverse health effect or systemic disorder, including an increased risk for cancer, Down syndrome, heart disease, osteoporosis and bone fracture, immune disorders, low intelligence, renal disorders, Alzheimer's disease or allergic reactions.

Research findings do not support an association between water fluoridation and negative health effects on plants and animals. Fluoride is a mineral that occurs naturally in virtually all waters. It is present in seawater at levels between 1.2 to 1.4 mg/L and in surface waters from 0.1 to over 1.0 mg/L, and can be found in some ground water over 10 mg/L. Because of the dilution effect of receiving waters relative to the volume of treated wastewater, a river's fluoride concentration will be measured at the same level upstream and downstream of a fluoridated community. Additives used for community water fluoridation are closely regulated and monitored.

### ***c. Cost-Effectiveness***

CWF is not only safe and effective, but it is also cost-saving and the least expensive way to deliver the benefits of fluoride to all residents of a community, regardless of age, education level or socioeconomic status. By preventing tooth decay, community water fluoridation has been shown to save money, both for families and the health care system. The estimated annual return on investment per person for community water fluoridation, including productivity losses, ranged from \$4.32 in small communities of 5,000 people or less, to \$27.41 in large communities of 20,000 or more people. For of more than 20,000 people, it costs about 50 cents per person to fluoridate the water. Every \$1 invested in this preventive measure yields approximately \$38 savings in dental treatment costs.

Fluoride from other sources prevents tooth decay as well, whether from toothpaste, mouth rinses, professionally applied fluoride treatments or prescription fluoride supplements. These methods of delivering fluoride, however, are more costly than water fluoridation and require a conscious decision to use them.

## **2. Historical Perspective**

In the 1930s the benefits of fluoride for teeth were discovered with dentists observing low tooth decay rates among people who resided in areas with naturally occurring fluoride. These observations were confirmed by scientific studies in the 1940s and 1950s when small amounts of fluoride were added to community water systems.

The early studies were primarily focused on children; however, today we know that community water fluoridation benefits people throughout the lifespan, especially our older adults and those individuals who do not receive regular dental care. Early studies, such as those conducted in Grand Rapids, Michigan, showed that water fluoridation reduced the amount of cavities children get in their baby teeth by as much as 60 percent and reduced tooth decay in permanent adult teeth

nearly 35 percent. Today, studies prove water fluoridation continues to be effective in reducing tooth decay by 20 percent to 40 percent, even in an era with widespread availability of fluoride from other sources, such as fluoride toothpaste. For additional information on the community fluoridation basics access: <http://www.cdc.gov/fluoridation/basics/index.htm>.

Currently, more than 210 million people in the United States are served by public water supplies containing enough fluoride to protect teeth. Even so, approximately 100 million Americans do not have access to fluoridated water. Healthy People 2020 is the plan that sets health goals for the nation. This plan calls for 79.6 percent of the population served by community water systems (CWS) will receive fluoridated water by year 2020. In South Carolina, the current population served by CWS with access to fluoridated water is approximately 93.3 percent.

The widespread availability of fluoride through water fluoridation, toothpaste and other sources, however, has resulted in the steady decline of dental decay throughout the United States.

In the early 1950s, several South Carolina water systems began adjusting fluoride to optimal levels to prevent tooth decay. The early adopters were the cities of Hartsville, Lancaster, Cayce, Orangeburg and Rock Hill. As of December 31, 2014, there were 56 community water systems (CWS) in South Carolina that adjusted their fluoride levels. These adjusted systems, along with community systems that they sell to and other natural systems, totaling 295, provided fluoridated water to 93.3 percent of the population that are on public water.

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## **B. CAPACITY TO MEET HEALTHY PEOPLE 2020 OBJECTIVES**

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The number of communities and people who benefit from water fluoridation is continuing to increase. This safe, healthy and effective public health intervention was initiated in 1945. In 2012, 74.6 percent of the U.S. population on public water systems, or a total of 210,655,401 people, had access to fluoridated water.

The Centers for Disease Control and Prevention (CDC) monitors the progress of the United States and individual states towards meeting the Healthy People 2020 objective to have 79.6 percent of people on public water supply will have access to fluoridated water at the recommended level for preventing tooth decay.

As of December 31, 2014, 93.3 percent of the South Carolina population served by 295 community water systems had access to fluoridated water and the benefits that come from it. Although 93.3 percent exceeds the HP2020 objective of 79.6 percent, this percentage was calculated based on the CWS flexibility and ability to comply with the Bureau of Water policy, adjusting the fluoride within a range of 0.7 -1.2 mg/L, rather than a single point. The new DHHS recommendations of adjusting fluoride at a single point of 0.7 mg/L have had an effect on how the proportion of the S.C. population meeting that criteria is calculated.

According to the Division of Oral Health (DOH) database and the Water Fluoridation Reporting System (WFRS), after the new recommendations came out, several CWS saw the single point of 0.7 mg/L as the ceiling for their adjustment and several of them have been reporting monthly fluoride levels ranging from 0.4-0.69 mg/L. CWS ability to precisely adjust at the 0.7mg/L, with appropriate trainings and education, is achievable, but it requires time, understanding and commitment on the CWS part to be successful.

Although, the proportion of the population that receives fluoride in their water, most likely will remain the same at 93 percent, the proportion of the population that receives fluoride at the optimal level of 0.7 mg/L will be lower during 2015.

The year 2015 will be our baseline year to determine the number of CWS that adjust fluoride below the recommended level of 0.7 mg/L. This baseline will determine the need for implementing comprehensive technical or educational training for each of the CWS, on a case-by-case basis. The success or failure of the first few CWS fluoridation efforts will determine the need for additional technical assistance from the CDC Fluoridation Engineer.

## 1. National Status

### *2012 National Water Fluoridation Statistics*

Total US population	313,914,040
US population on community water systems (CWS)	282,534,910
Total US population on fluoridated drinking water systems	210,655,401
Percentage of US population receiving fluoridated water	67.1%
Percentage of US population on CWS receiving fluoridated water	74.6%
Total number of CWS in United States	52,734
Number of CWS providing fluoridated water	18,502
Number of CWS adjusting fluoride	5,999
Number of CWS consecutive to systems with optimal fluoride levels	6,342
Number of CWS with naturally occurring fluoride at or above optimal levels	6,151
Population served by CWS with naturally occurring fluoride at or above optimal levels	11,116,202

## 2. South Carolina Status

### *2014 South Carolina Water Fluoridation Statistics*

Total SC population (2010 US Census)	4,679,230
SC population on community water systems (CWS)	3,721,676
Total SC population on fluoridated drinking water systems	3,474,868
Percentage of SC population receiving fluoridated water	74.2%
Percentage of SC population on CWS receiving fluoridated water	93.3%
Total number of CWS in South Carolina	644
Number of CWS providing fluoridated water	333
Number of CWS adjusting fluoride	56
Number of fluoridated consecutive CWS	178
Number of CWS with naturally occurring fluoride at 0.7 mg/L or above	69
Population served by CWS with naturally occurring fluoride at 0.7 mg/L or above	96,796

### **3. Progress, Trends and Challenges**

Our objectives are a) to maintain the proportion of the population on public water who receive and benefit from fluoridated water, and b) to increase the proportion of the population served by community water systems (CWS) that receive fluoride at the recommended level of 0.7 mg/L. The state's fluoridation status is reported and monitored on a monthly basis in the Water Fluoridation Reporting System (WFRS), a national database managed by the CDC. South Carolina started to report fluoridation in the CDC WFRS in 2002. For several years, South Carolina has managed to maintain the fluoridation status at 93 percent of the population served by community water systems that adjust the fluoride level, exceeding HP2010 and HP2020 objectives.

The 2015 recommendation of 0.7 mg/L of fluoride, announced by DHHS and CDC in April 2015, has had an effect and presents a significant challenge to maintaining the fluoridation status for the populations served by community water systems in South Carolina. This challenge is best demonstrated by the recent anti-fluoridation activities that have surfaced within the last year. At least 10 communities have revisited the adjustment of water fluoride levels and have considered the possibility of ceasing water fluoridation. This challenge is complicated by a recent review of monthly reporting of fluoride levels from several community water systems (CWS) that are intentionally fluoridating at a level below the recommendation of 0.7 mg/L. There appears to be confusion over the difference between a public health recommended level and an EPA and state-regulated maximum contaminant level (MCL).

Recent anti-fluoridation activities and the number of water systems with reporting levels below the 0.7 mg/L recommendation present major challenges for the Division of Oral Health (DOH) in meeting the objectives of the 2020 State Oral Health Plan and HP2020.

One of the priorities for the future is increased collaboration with stakeholders to establish a Rapid Response Team, which will be responsible for working closely with the Fluoridation Task Force to address fluoridation issues, threats or media questions raised at the local or state level. Most of the work will be focused on increasing awareness about the benefits of community water fluoridation through community outreach, trainings and education of water operators, water engineers and administrators, community members, health care professionals, school nurses and teachers.

A second priority is establishing a baseline of the CWS that adjust fluoride below the recommended level of 0.7 mg/L; the focus will be on increasing the number of the CWS that adjust and report the fluoride at the recommended level of 0.7 mg/L and improve fluoride data quality. The DOH will collaborate with the Office of Performance Management to develop quality assurance activities that will improve the quality of fluoride data, utilizing quality improvement strategies, including PDSA cycles. The DOH will collaborate with the SC Dental Association and SC Oral Health Coalition to develop trainings focused on fluoridation technical principles, education and promotion.

A third priority is to increase awareness of the benefits of community water fluoridation within the state, including within DHEC. Signs demonstrating the benefits of water fluoridation are available but have yet to be posted above water fountains in any DHEC facilities. However, the signage has been distributed to medical and dental offices as well as within community settings. This dissemination outside of the agency will continue. Increasing agency and public awareness of the benefits of this proven, safe and effective public health intervention helps to defuse well-meaning but misinformed attacks on community water fluoridation.

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## C. LAWS AND REGULATIONS

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### 1. **Federal Law and Regulations**

#### *a. Safe Drinking Water Act (SDWA)*

The Safe Drinking Water Act (SDWA) is the main federal law that ensures the quality of Americans' drinking water. Under SDWA, Environmental Protection Agency (EPA) sets standards for drinking water quality and oversees the states, localities and water suppliers that implement those standards. SDWA was originally passed by Congress in 1974 to protect public health by regulating the nation's public drinking water supply.

Under the Safe Drinking Water Act (SDWA), EPA sets legal limits on the levels of certain contaminants in drinking water. The legal limits reflect both the level that protects human health and the level that water systems can achieve using the best available technology. Besides prescribing these legal limits, EPA rules set water-testing schedules and methods that water systems must follow. The rules also list acceptable techniques for treating contaminated water. SDWA gives individual states the opportunity to set and enforce their own drinking water standards if the standards are at least as strong as EPA's national standards. Access additional information at: <http://www.epa.gov/ogwdw000/sdwa/index.html>

#### *b. Title 40 – Protection of Environment, Chapter I—Environmental Protection Agency, Subchapter D-Water Programs, Part 141—National Primary Regulations*

This part establishes primary drinking water regulations pursuant to section 1412 of the Public Health Service Act, as amended by the Safe Drinking Water Act (Pub. L. 93–523) and related regulations applicable to public water systems. Access at: [http://www.ecfr.gov/cgi-bin/text-idx?tpl=/ecfrbrowse/Title40/40cfr141\\_main\\_02.tpl](http://www.ecfr.gov/cgi-bin/text-idx?tpl=/ecfrbrowse/Title40/40cfr141_main_02.tpl)

#### *c. Title 40 – Protection of Environment, Chapter I—Environmental Protection Agency, Subchapter D-Water Programs, Part 142—National Primary Regulations Implementation*

This part sets forth, pursuant to sections 1413 through 1416, 1445 and 1450 of the Public Health Service Act, as amended by the Safe Drinking Water Act, Public Law 93–523, regulations for the implementation and enforcement of the national primary drinking water regulations contained in part 141 of this chapter. Access at: [http://www.ecfr.gov/cgi-bin/text-idx?tpl=/ecfrbrowse/Title40/40cfr142\\_main\\_02.tpl](http://www.ecfr.gov/cgi-bin/text-idx?tpl=/ecfrbrowse/Title40/40cfr142_main_02.tpl)

### 2. **State Law and Regulations**

#### *a. Title 44 – Health Chapter 55, Article 1, the State Drinking Water Act*

The SC Department of Health and Environmental Control's responsibility for the oversight of the drinking water is established in the South Carolina Code of Laws Title 44 – Health Chapter 55 Article 1 includes the State Safe Drinking Water Act. The State Drinking Water Act can be accessed at: <http://www.scstatehouse.gov/code/t44c055.php>

***b. State Primary Drinking Water Regulation: R.61-58***

Regulations 61-58 through 61-58.17 are promulgated pursuant to SC Code Sections 44-55-10 and are collectively known as the State Primary Drinking Water Regulations and were updated on September 27, 2014. The regulations provide standards and procedures necessary to maintain reasonable standards of purity of the drinking water of the state consistent with the public health, safety and welfare of its citizens. Access the regulations at: <http://www.scdhec.gov/Agency/docs/water-regs/r61-58.pdf>

**3. Mandatory Water Fluoridation Law**

There is no state mandate for community water fluoridation presently in South Carolina.

**4. Local Laws and Ordinances**

***a. Municode.com-Search Engine for Municipal Laws and Ordinances***

The Municipal Code Corporation has created a library of the municipal laws and ordinances available at their website. Access it at: <http://www.municode.com/Library/Library.aspx> .

***b. South Carolina Association of Counties (SCAC)***

The SCAC website includes a directory that contains contact information for county officials. Access the directory at:

<http://www.sccounties.org/publications/directory-of-county-officials.aspx>

**5. Specific Regulations**

***a. Fluoridation Chemicals R61-58.2(D)(7):***

Fluoridation - Commercial sodium fluoride, sodium silicofluoride and hydrofluorosilic acid shall be NSF approved and shall conform to American Water Works Association Standards B701, B702 and B703, respectively. Fluoride chemicals shall meet the requirements of chemical additives in R.61-58.2(E)(3). The proposed method of fluoride feed shall be approved by the Department prior to preparation of final plans and specifications.

- i. *Fluoride Compound Storage* Dry chemical storage shall be designed in accordance with R.61-58.2(E)(2)(e). Storage units for hydrofluorosilic acid shall be isolated from operating areas and shall be vented to the atmosphere at a point outside any building.
- ii. *Injection Point*- The fluoride compound shall not be added before ion exchange softening or before lime addition, to avoid precipitation of fluoride.
- iii. *Chemical Feed Installations* - Fluoride feed systems shall meet the following criteria:
  - (a) Scales or loss-of-weight recorders for weighing the quantity of chemicals added shall be provided:
  - (b) Feed equipment shall have an accuracy to within five (5) percent of any desired feed rate;

- (c) The point of application of hydrofluorosilic acid, if into a pipe, shall be in the lower half of the pipe and project upward at an angle approximately forty (40) degrees and extend into the pipe one-third of the diameter; and
  - (d) All fluoride feed lines shall be provided with adequate anti-siphon devices;
  - (e) All fluoride feed systems shall be equipped with fail-safe system to prevent the continued feed of fluoride at times when there is no flow of water through the fluoride feed point.
- iv. *Protective equipment-* At least one (1) pair of rubber gloves, a respirator of a type certified by the National Institute for Occupational Safety and Health for toxic dusts or acid gas (as necessary), an apron or other protective clothing, goggles or face masks shall be provided for use by the operator. Other protective equipment may be required, as deemed necessary by the Department.
- v. *Dust Control*
- (a) Provisions shall be made for the transfer of dry fluoride compounds from shipping containers to storage bins or hoppers in such a way as to minimize the quantity of fluoride dust which may enter the room in which the equipment is installed. The enclosure shall be provided with an exhaust fan and dust filter to the outside atmosphere of the building.
  - (b) Provisions shall be made for disposing of empty bags, drums and barrels in a manner which will minimize exposure to fluoride dusts. A floor drain shall be provided to facilitate the washing of the floors.

***b. Maximum Contaminant Levels in Drinking Water: R.61.58.5.B***

R.61.58.5.B defines the Maximum Contaminant Levels (MCLs) for inorganic chemicals including fluoride, sampling and analytical requirements, monitoring for compliance.

***c. Secondary Maximum Contaminant Levels in Drinking Water: R.61.58.5.R***

R.61.58.5.R defines the Secondary Maximum Contaminant Levels (SMCLs) for inorganic chemicals including fluoride. Water systems that exceed the secondary MCL for fluoride must make public notice.

***d. Engineering Plans and Specification***

R.61-58.2(D) (4). (7): The proposed method of fluoride feed shall be approved by the SC DHEC prior to the preparation of final plans and specifications.

Fluoride Addition Design Checklists are utilized by DHEC to assess the engineering plans and specifications submitted to the agency for approval. See Appendix 1 and Appendix 2 for *Surface Water - Fluoride Addition Design Checklist*; and *Ground Water - Fluoride Addition Design Checklist*.

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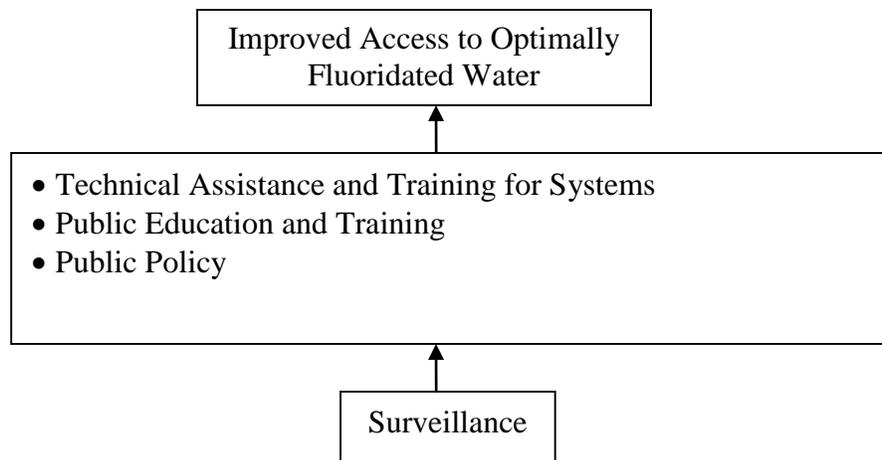
## D. LOGIC MODEL

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**Background** – The Division of Oral Health (DOH) and the Bureau of Water (BOW) have formalized their relationship within DHEC with establishment of a Water Fluoridation Technical workgroup. This workgroup meets quarterly to address CWF, Fluoridation Plan and any new emerging issues related to water fluoridation. It is important to note that each member of the workgroup brings a wealth of knowledge and expertise from their respective areas.

A Coalition workgroup was formed at the December 2006 Quarterly Advisory Summit to address policy, advocacy and public education of fluoridated water. The group developed their objectives in February 2007. At the National Oral Health Conference in April 2008, the DOH Director presented a roundtable highlighting South Carolina’s development of internal and external partnerships for improving access to CWF. The workgroup was re-established in April 2013 with focus on Water Fluoridation Education and Training of healthcare providers and community members.

### *Logic Model*



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## E. PROGRAM MANAGEMENT

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### 1. Administration/ Management

In 2002, the DOH received funding through a cooperative agreement with the CDC to establish a state-based oral disease prevention program. A key requirement of the cooperative agreement was to establish a state-level water fluoridation program. The DOH serves as the administrator of the South Carolina Fluoridation program. The DOH is responsible for (1) managing and monitoring the fluoridation program; (2) Promoting water fluoridation; and, (3) providing liaison with other state and federal agencies. Each DOH staff member has specific duties assigned to them, which combined fulfill the DOH responsibilities for the fluoridation program.

The need for better implementation of the fluoridation program in South Carolina called for a formalization of the DOH and BOW relationship within DHEC. This relationship brought to the table the much-needed technical assistance and expertise of the BOW staff. Key staff members from the DOH and BOW function as a SC Oral Health Advisory Council & Coalition (SCOHACC) workgroup called Water Fluoridation Technical, whose role is to address continuous quality improvement issues with: (1) recording and dissemination of WFRS data; (2) community water fluoridation training opportunities for water operators; (3) dissemination of educational materials for water operators and water fluoridation equipment inspections; and, (4) annual sanitary surveys that include inspection of fluoridation equipment. The communication between the DOH and the BOW is maintained through Quarterly Workgroup meetings. The contents of these administrative meetings are also reported at the Quarterly Advisory Summits (QAS) of the SCOHACC.

### 2. Personnel:

**DOH Director:** The Director, on behalf of the DOH, reviews all fluoridation questions and clinical issues presented to the division related to water fluoridation. The Director consults with the fluoridation coordinator, and other internal staff members as well as external experts such as the CDC or the American Dental Association (ADA). The DOH Director also participates in the Technical and Education & Training Workgroups.

**DOH Program Coordinator II:** The Program Coordinator II is primarily responsible for overseeing the management and implementation of the Fluoridation program in the state. The Program Coordinator II serves as chair for both Water Fluoridation Technical and Water Fluoridation Education & Training workgroups. In addition, the Program Coordinator II conducts quarterly workgroup meetings, develops action plans based on the objectives of the SOHP and provides Water Fluoridation reports at the Quarterly Advisory Summits. The Program Coordinator II also completed the CDC's "Water Fluoridation: Principles and Practices" training on February 2013 in Sacramento, California.

**DOH Epidemiologist:** The DOH Epidemiologist is responsible for integration of water fluoridation into the Oral Health Surveillance System and for generating an annual evaluation of fluoridation based on the objectives of the State Oral Health Plan (SOHP). The system contains data generated from the WFRS database as well as information in regards to water operator

training, education and advocacy training, success stories, community issues related to fluoridation, and the mini-grant program.

***DOH Education Consultant and Outreach Specialist:*** The DOH Education Consultant and Outreach Specialist reviews all educational materials produced by the DOH for community outreach and public dissemination and also provides training when requested for community education and advocacy as it relates to water fluoridation.

***DHEC Division of Media Relations and Art Department:*** DHEC Media Relations Director and staff members provide technical assistance when requested for community education and advocacy as it relates to water fluoridation. The art department produces educational materials, posters and signs that relate to water fluoridation that are developed by DOH staff.

***BOW Drinking Water Section Manager:*** The Drinking Water Manager provides the connection between DOH and BOW, attends the quarterly meetings with the DOH, and is a member of the SC Oral Health Advisory Council. The manager provides leadership in conducting the water operator training based on the CDC Water Fluoridation Training curriculum.

***BOW Engineers – Fluoridation Specialists:*** Since the inception of funding from CDC, engineers from the BOW have attended the CDC Water Fluoridation Training. They provide technical assistance to the DOH, water systems/operators and the workgroup as requested. They also provide technical assistance and serve as Fluoridation Liaison between DOH and BOW.

***BOW Well Water Manager:*** In order for medical and dental providers to conduct a fluoride history on their patients at risk for tooth decay, it is vital for community members to have their well water tested prior to prescribing fluoride supplements for children. The well water manager has worked in collaboration with the DOH and local community providers in conducting a fluoride testing program for children served by well water.

### **3. External Partners to DHEC**

***Centers for Disease Control and Prevention (CDC) Division of Oral Health:*** The CDC provides technical assistance to state programs regarding engineering support, facility management, and operational support and also provides responses to public health-related questions on community water fluoridation. In addition the CDC serves as a resource to other federal government agencies, state programs and professional organizations and associations.

***American Dental Association (ADA):*** The Manager of Fluoridation and Preventive Health Activities from the Council on Access, Prevention and Inter-professional Relations provides technical assistance and training on community water fluoridation. The manager has presented on several occasions at events sponsored by the SC Oral Health Coalition and the Fluoridation Education and Training Workgroup.

***South Carolina Oral Health Advisory Council and Coalition (SCOHACC):*** The SCOHACC has a broad representation from a variety of agencies, organizations and community groups that has resulted in leveraging opportunities to improve the oral health of our residents. Partnership

development is an expectation of each DOH staff member and is delineated in his or her individual work plan (IWP).

The water fluoridation workgroups present their report at each Quarterly Advisory Summit (QAS) of the SCOHACC. In addition, fluoridation policy issues are shared with the Advisory Council for their consideration and recommended action.

***Water Fluoridation Education and Training Workgroup:*** This Coalition workgroup was formed at the December 2006 Quarterly Advisory Summit to address policy, advocacy and public education about fluoridated water. At that time it was called the Water Fluoridation Education and Advocacy workgroup. The group developed their objectives in February 2007. The SCOHACC workgroup specifically recommended five strategies to be considered on a priority basis: (1) provide training and educational materials to water operators; (2) establish a link between the Columbia Water Operator and the Coalition; (3) develop fact sheets; (4) educate local groups with the help of the Coalition; and, (5) organize a session with DHEC's Media Relations to improve communication skills of those who come into contact with the public, especially to prepare them to face possible anti-fluoridation movements in the future. With staff changes within DOH and BOW, the workgroup went dormant for about two years. The workgroup was re-established in April 2013 with focus on Water Fluoridation Education and Training of health care providers and community members.

To date, activities have been performed for each of the above strategies and the resulting progress has been reported at the Quarterly Advisory Summit (QAS) of the SCOHACC.

***South Carolina Dental Association's "Strike Force for Water Fluoridation":*** In 2007, Dillon City Council decided to discontinue fluoridation of the city's water supply at the request of the water operators. Timely intervention by the local dentists led to the overturn of the City Council's decision. This episode led the Board of Governors of the SC Dental Association (SCDA) to establish a "Strike Force for Water Fluoridation." This episode also set in motion a series of collaborative activities between the DOH and the SCDA. For example, they hosted a training on risk communication that DHEC's Media Relations staff conducted to strengthen the knowledge and the response of local dentists. The SCDA collaborated with the DOH in organizing an awards ceremony at the EdVenture Children's Museum on February 27, 2008, honoring water systems who had been fluoridating water for 50 years. The strengthened partnership between the DOH and SCDA and the collaboration with DHEC Media Relations has set the stage for additional endeavors to strengthen South Carolina's water fluoridation program.

The Strike Force was called into action in 2008, in response to anti-fluoridation activity in Aiken, SC. The SCDA collaborated with the DOH in providing technical assistance to the local dentists who took the lead in organizing the event. Additionally ADA Fact Books were made available and were paid for by the SCDA.

The SCDA remains committed to ensuring access to fluoridated water throughout the state and is ready to deploy the Strike Force when needed.

***Education, Training and Technical Experts:*** An essential component of a fluoridation program is access to individuals and programs that integrate or support community water fluoridation.

Technical experts are present both within DHEC and external to the agency at the local, state and national levels.

***Community level advocacy groups:*** The community-level advocacy groups are comprised of community members who have participated in the “Fluoridation 101” training provided within local communities. These diverse groups consist of water operators, water engineers, dentists, pediatricians, Head Start staff and other local oral health advocates.

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## F. QUALITY CONTROL

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### 1. Compliance with Engineering and Administrative Recommendations for Water Fluoridation (EARWF)

#### a. Monitoring and reporting

##### i. *Frequency of Reporting*

Fluoride levels are reported monthly by each adjusted water system. These data are received and entered in EFIS by BOW. These data then are reviewed by water engineers for quality assurance and a portion of the data pertaining only to fluoride are extracted and sent monthly to DOH.

The epidemiologist reviews the data, which is entered monthly to the WFRS. Natural Fluoride levels are reported every three years by natural and non-adjusting water systems. The Division of Oral Health's epidemiologist enters the data into the WFRS as reported.

##### ii. *Monitoring*

Data is monitored by the DOH Program Coordinator and Epidemiologist, who report findings to the Water Fluoridation Technical workgroup and Water Fluoridation Education and Training workgroup on a quarterly basis. Also they produce reports to distribute to the SCOHACC at the Quarterly Advisory Summit meetings.

##### iii. *Use of WFRS*

- The Water Fluoridation Reporting System (WFRS) is an online tool that helps states manage the quality of their water fluoridation programs. WFRS information is also the basis for national surveillance reports that describe the percentage of the U.S. population on community water systems who receive optimally fluoridated drinking water. The system was developed by CDC in partnership with the Association of State and Territorial Dental Directors (ASTDD).
- Water systems that adjust the fluoride of their water to the optimal level for decay prevention also collect data to monitor fluoridation quality. This information includes average fluoride concentrations, results of daily testing and laboratory split sample results. The dates of facility inspections, operator training and other relevant information also can be included.
- The DOH Epidemiologist enters all of these data into the WFRS and generate reports that can be used to assure program quality.

##### iv. *Split sampling*

In its [Engineering and Administrative Recommendations for Water Fluoridation](#), CDC recommends that states operate a split-sample program with the water systems in their jurisdictions.

Operators of community water systems typically test water fluoride content every day. To verify the accuracy of their testing method, they also collect a sample, typically once a month, and split the sample into two parts. One part of the sample is tested on-site, and the second part is sent to a state laboratory or accredited laboratory for verification testing. This comparison reveals if the particular laboratory technique is correct, and if the reported results are accurate.

**b. Adoption of engineering controls (overfeed protections)**

*i. Overfeed*

The risk of an overfeed has been reduced by the State Primary Drinking Water Regulation: R. 61-58.2 (7) c.(v), which requires fluoride feed systems to be equipped with a fail-safe system to prevent the continued feed of fluoride at times when there is no flow of water through the fluoride feed point.

In addition, the water system is instructed to notify SC DHEC BOW to receive technical assistance in case of an overfeed, and consistent with the following operating procedures:

- Shutting down the equipment;
- Flushing out the water lines containing the high fluoride concentration (greater than or equal to 10 mg/L) and,
- Notifying the public to prevent consumption of drinking water with high fluoride concentration.

**2. Additives**

- a. Fluorosilicic acid: a water-based solution used by most water systems in the United States. Fluorosilicic acid is also referred to as hydrofluorosilicate , FSA or HFS.
- b. Sodium fluorosilicate: a dry additive, dissolved into a solution before being added to water.
- c. Sodium fluoride: a dry additive, typically used in small water systems, dissolved into a solution before being added to water.
- d. See Surface Water and Ground water – Fluoride addition design checklists in the Appendix 1 and Appendix 2

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## G. EDUCATION AND TRAINING

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### 1. Water Fluoridation Trainings

#### *CDC-sponsored Water Fluoridation: Principles and Practices*

The CDC sponsored *Water Fluoridation: Principles and Practices* serves as the foundational core of information for education and training for the state. The 3-day course includes a 6-hour water plant operator training course template designed for use by state fluoridation programs. In its Water Operation Trainings the BOW utilizes the six-hour water plant operator training course template.

- a. Goal of Training: It is intended to build the skills needed to manage and operate a state water fluoridation program and to train engineers in drinking water programs and water fluoridation specialists on the principles of fluoridation engineering
- b. Where: The course is offered periodically in Tennessee and California.
- c. Dates: Generally September/October in Tennessee and February/March in California. Exact dates can be found at the CDC website:  
<http://www.cdc.gov/fluoridation/engineering/training.htm>.
- d. Attendance: It is important to pre-register due to a limited number of participants. Preference is given to state employees.
- e. Course Registration: There is no tuition fee for accepted state program employees.
- f. Travel/Per Diem: Attendees are responsible for their own travel and per diem expenses.
- g. Continuing Education: 1.8 continuing education units (CEUs) or 18 professional development hours for completing the course, which is conducted over three days.

#### *Water Fluoridation Reporting System (WFRS) Training*

CDC sponsors an optional half-day course (0.3 CEUs) on the use of the WFRS for those individuals responsible for maintaining records for a state program. See CDC Course schedule for training dates: <http://www.cdc.gov/fluoridation/engineering/training.htm>

#### **Fluoridation 101 training established by SCDA and DOH**

The Fluoridation 101 training was developed as part of a HRSA Workforce grant. It is based on the ADA water fluoridation training and also includes a community component that explains how dentists, medical providers and community programs such as Head Start can support and convey positive messages about water fluoridation. As part of the training attendees are given resources that can be distributed and signage that can be displayed promoting fluoridated water.

### 2. Water Fluoridation Publications and Educational Resources

#### *CDC Water Facility Operator Fluoridation Poster*

To enhance the training of the water system operators, DOH has printed and laminated the CDC Water Facility Operator Fluoridation poster with South Carolina-specific contact

information for the BOW-DOH. The poster is distributed to water systems at multiple water system trainings and meetings. This poster provides information on:

- a. Safety;
- b. Operational guidance;
- c. Optimal fluoridation levels;
- d. Community benefits of fluoridation; and,
- e. SC drinking water program contact information.

### ***Nature's Way to Prevent Tooth Decay (English and Spanish)***

For public education and advocacy, the DOH has produced a South Carolina version of the ADA/CDC-developed *Nature's Way to Prevent Tooth Decay* brochure and made it accessible through the DHEC Education Resource Center and at the CDC website: <http://stacks.cdc.gov/view/cdc/5198> .

This allows local health departments, water systems personnel, dental professionals and community members to access the brochure "Nature's Way to Prevent Tooth Decay".

### ***Nature's way to prevent tooth decay...drink water with fluoride signs***

In 2009, EdVenture Children's Museum in Columbia, SC (the 10th largest children's museum in the world), agreed to display signs over all the water fountains in the museum promoting the CDC message, "Nature's way to prevent tooth decay...drink water with fluoride". This initial signage led to the development and production of a "Natural Way to Prevent Tooth Decay...Drink water with Fluoride." These signs are distributed as part of the Fluoridation 101 training as well as through Head Start and other community-based trainings.

### ***Drinking Water...What Parents Need to Know***

In an effort to support consumer knowledge about the benefits of drinking fluoridated water, the DOH developed a simple dual language flier for parents and caregivers. This flier is disseminated and included in the resource kits for home visitation trainings, Head Start staff trainings as well as childcare provider trainings. They are also part of a Tool Kit for Medical and Dental Providers.

### ***DHEC Website Links and Resources***

- a. A link to *My Water's Fluoride* entitled "Check the fluoride level in your water system". Access at: [https://nccd.cdc.gov/DOH\\_MWF/Default/Default.aspx](https://nccd.cdc.gov/DOH_MWF/Default/Default.aspx)
- b. A *Fact Sheet on Community Water Fluoridation in SC* is posted at the DOH website ([http://www.scdhec.gov/Health/docs/water\\_fluoridation\\_flyer.pdf](http://www.scdhec.gov/Health/docs/water_fluoridation_flyer.pdf)) and has been disseminated through trainings and the SCOHACC.

Links to other related resources from the CDC and the ADA are available from the DHEC Fluoridation Webpage:

<http://www.scdhec.gov/Health/ChildTeenHealth/OralHealthforChildren/Fluoridation/>

### ***Fluoridation Education and Advocacy Trainings***

Since 2006, the DOH and BOW have sponsored specific trainings for the education and advocacy of community water fluoridation. The need for training was first identified in response to a threat that occurred in Dillon, SC, in regards to the removal of fluoride from the local drinking water. This issue brought together key stakeholders from DHEC, the SCDA, ADA and the community dentists in order to expand their knowledge and understanding of community water fluoridation, the benefits and risks and how to become an effective spokesperson on behalf of water fluoridation.

### ***Water Fluoridation Program Database***

The database contains information related to all Education and Advocacy Workgroup and Training events conducted by the DOH, BOW and the SC Oral Health Advisory Council and Coalition Workgroups such as:

- a. Specific training information and participants
- b. Local Community Issues and Responses
- c. Community Education and Advocacy
- d. Workgroup Reports

### ***Sealing the Gap in Oral Health Disparities: The Burden of Oral Disease in South Carolina 2013 Report***

The Burden of Oral Disease in South Carolina document produced by DOH staff provides an overview of oral disease burden in our state. State and national data provide a picture of the Community Water Fluoridation (CWF) status in South Carolina.

## **3. Water Fluoridation Specialists**

Any candidate who receives the CDC training will be included in the inventory of fluoridation specialists in South Carolina. As specialists, these individuals provide technical assistance to the fluoridation coordinator on fluoridation-related issues with local water operators and water systems. In addition, they provide guidance to the BOW and the DOH on drinking water and fluoride. This inventory is part of the BOW-DOH Fluoridation Program Database.

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## H. SURVEILLANCE DATA

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### Water Fluoridation Reporting System (WFRS)

The South Carolina Oral Health Surveillance System includes both the CDC's Water Fluoridation Reporting System (WFRS) and the DOH—BOW Fluoridation Program Database, which expands upon the data collected in the WFRS and includes policy and process objectives as they relate to the State Oral Health Plan's chapter on Water Fluoridation.

The CDC utilizes the WFRS for data management and surveillance of water fluoridation in the United States. South Carolina participates in the WFRS. The WFRS is an online tool that helps states manage the quality of their water fluoridation programs. WFRS information is also the basis for national surveillance reports that describe the percentage of the U.S. population on community water systems who receive fluoridated drinking water. The system was developed by CDC in partnership with the ASTDD.

In March 2015, WFRS version 2.2 was implemented using updated program coding, improving the user interface, bolstering security and reliability, and simplifying the business logic models.

Information in the WFRS is available to the public through the CDC website, *My Water's Fluoride*, where residents can determine whether or not their drinking water is fluoridated. The quality of this data is important since our health care providers utilize this system in assessing the need for fluoride supplements in young children as well as the need for topical fluoride treatments for individuals at risk for tooth decay throughout their lifespan.

### SC DHEC – Environmental Facility Information System (EFIS)

EFIS is SC DHEC's database where the data from all drinking water reports are entered. Adjusted fluoride levels are entered into EFIS monthly.

### Monitoring the Quality of Water Fluoridation

Water systems that adjust the fluoride of their water to the optimal level for decay prevention also collect data to monitor fluoridation quality. This information includes average fluoride concentrations, results of daily testing and laboratory split sample results. The dates of facility inspections, operator training and other relevant information also can be included.

The DOH Epidemiologist enters all of this data into the WFRS and generates reports that can be used to assure program quality. The following presentation provides a [Water Fluoridation Reporting System Overview](#)  [PPT–2M]  [PDF–1.6M] showing basic application interface features and data organization.

## **1. Adjusted, Natural and Non-Fluoridated Systems**

### ***a. Water Systems – Adjusting Fluoride Levels***

All surface water treatment plants submit monthly operation reports to DHEC's Drinking Water Protection Division for review. Among the data submitted are daily dosages of adjusted fluoride. Groundwater systems that adjust fluoride are required to submit a monthly report that also contains daily adjusted fluoride levels. As of December 31, 2014, there were 56 Community Water Systems in South Carolina that adjust fluoride.

### ***b. Water Systems – Natural Fluoride Levels***

Water systems in which the natural fluoride is present at levels greater than or equal to the optimum level of 0.7 mg/ L. All water systems are sampled for many chemicals as outlined by the US Environmental Protection Agency (EPA). The sampling protocol for fluoride falls under inorganic chemical (IOC) monitoring. These chemicals are measured in the untreated water on a three-year cycle. Systems that have fluoride in their source water are considered naturally fluoridated. The results from the IOC sampling for fluoride are entered into the US EPA's Safe Drinking Water Inventory System, or SDWIS. SDWIS is then used to enter the natural fluoride levels in the WFRS.

As of December 31, 2014, there were 69 water systems that have natural fluoride present in their water supply, with levels ranging from 0.7 mg/L to 3.4 mg/L.

### ***c. Water Systems- Non-Fluoridated***

These include all water systems that do not adjust the level of fluoride and that have a natural fluoride presence in the water supply that is below the recommended level of .7 mg/L. As of December 31, 2014, there were 311 Non- Fluoridated water systems in South Carolina.

## **2. Consecutive Systems**

Any water system that purchases water supply from another water system is considered a consecutive system. As of December 31, 2014, there were 178 consecutive water systems in South Carolina that provide optimally fluoridated water.

## **3. Communities served and not served by fluoridation**

As of December 31, 2014, there were a total of 644 community water systems in South Carolina. About 333 of them provided fluoridated water.

## **4. Population receiving and not receiving fluoridated water**

According to US Census of 2010, South Carolina's population is 4,679,230. Almost 80 percent of the total population in South Carolina (3,721,676) receives water from a public water system. Out of this population, approximately 93.38 percent (3,475,179) have access to fluoridated water.

## 5. System specific data

- a. *Start date:* Fluoridation start date
- b. *Additive used:* Type of fluoride used
- c. *Background F level:* Natural level of fluoride in the water supply
- d. *Submission of fluoride level data*

Water systems that adjust the fluoride of their water to the level that prevents tooth decay also collect data to monitor fluoridation quality. This information includes average fluoride concentrations and results of daily testing. The dates of facility inspections, operator training and other relevant information also can be included.

The fluoridation coordinator extracts the fluoride reports from the Environmental Facility Information System (EFIS) and enters them directly into the WFRS on a monthly basis. State fluoridation managers then generate reports that can be used to assure program quality. A Microsoft PowerPoint presentation that provides a WFRS Overview can be accessed at: <http://www.cdc.gov/fluoridation/engineering/training.htm>

**Step 1:** The procedure for the WFRS starts with the water system submitting monthly fluoride data.

- Water system personnel monitor daily fluoride levels in the treated water leaving the treatment plant.
- Water systems that have received funding through the fluoridation mini-grant program are required to send one sample a month to an independent lab in addition to testing done by the water plant lab.
- Each water system is required to send operational reports to the state once a month. The report includes, but is not limited to:
  - The amount of water used;
  - Amount of pounds/gallons of chemical utilized daily;
  - Chemical dosage in milligrams per liter;
  - Raw pounds of split sample is required;
  - Other information required by the state; and,
  - The results of monthly split sample(s).
- Monitoring Activity by Water System
  - The calculated dosage should be cross-checked against the reported fluoride levels to spot chronic non-optimal operation.
  - On an annual basis, the system's raw water source (i.e., water that has not been treated) is analyzed for fluoride by a DHEC-approved laboratory.
- Monthly activity conducted by the state
  - Review monthly reports; and,
  - Call or contact water system if necessary if problems or inconsistencies are found.

**Step 2: DHEC Data Process**

- Fluoride sample data is entered in the Environment Facility Information System (EFIS) Plant-by-plant each day of the month.

- The information above in step 1 is extracted from EFIS and imported into an excel file.
- The data in this file is entered directly into the WFRS on monthly basis.

**6. DOH Database:**

*Overview:* The epidemiologist is responsible for the integration of water fluoridation into the Oral Health Surveillance System and generating evaluation of fluoridation based on the objectives of the State Oral Health Plan. The system contains data generated from the WFRS database, as well as information in regards to water operator training, water fluoridation education and training, success stories and community issues related to fluoridation (see table below). A Community Water Fluoridation sub-database has been created to house the aforementioned materials.

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**WATER FLUORIDATION INDICATORS UNDER SURVEILLANCE**

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Oral Health Indicators Database/WFRS	Source: DHEC/BOW/EFIS/DOH
Estimated averted decay and /or treatment costs attributable to water fluoridation	
% of people served by CWS who receive optimally FL water	
# of requests for scientific evidence on the safety of CWS	
# and location of communities where outreach occurred	
# of media placements promoting water fluoridation	
# of water operators trained	
# of trainings provided	
# of inspections performed	
# of WS participating in split sampling	
# of WS needing replacement	
# of WS receiving funds for replacement.	
Amount of money given for new or replacement equipment	
% of adjusted WS that maintain optimal FL levels annually	

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Training is a key component for the DOH CQI process. Any candidate who receives the CDC training (*Water Fluoridation: Principles and Practices*) will be included in the inventory of fluoridation specialists in South Carolina. Through the Oral Health Training and Resource Center, the DOH will continue to facilitate access to Water Fluoridation Training and resources to operators and water systems.

*Target Population:* All population of South Carolina that is served by public water systems.

*Collaborations:* DHEC BOW, SCDA, ADA, Pew Charitable Trust, Rural Water Associations, USC SCRHRC, SCOHACC and the Water Fluoridation Workgroup.

*Timeline:* Fluoride levels for all adjusted community water systems are entered monthly to the WFRS. Data is extracted from the state's databases, EFIS and SDWIS through the collaboration with the BOW.

Other information is continually updated and is readily accessible to all DOH staff for responding to outside requests and is utilized for implementing policy. This inventory was also updated with a 2014 survey of public water systems to determine equipment and training needs.

The DOH Epidemiologist in collaboration with the BOW manages the Fluoridation Database. It contains the following information:

***a. Public Water System Status Information***

- Names of adjusted, natural and non-fluoridated systems;
- Names of all optimally fluoridated water systems in the state;
- Names of all consecutive systems (i.e., a public water system that buys water from another public water system) that purchase water from fluoridated water systems;
- Names of all communities served and not served by fluoridation; and,
- Populations receiving and not receiving fluoridation.

***b. Public Water System that Adjust Fluoride Content –Specific Information***

- Start date
- Additive use
- Background fluoride level
- Submission of fluoride level

***c. Public Water System that De-fluoridate –Specific Information***

- Start date
- Removal process:
  - Reverse Osmosis or
  - Blending
- Background fluoride level
- Submission of fluoride level

***d. Public Water System that Adjust Fluoride Content—Equipment Replacement***

- Fluoridation Mini-Grant Program Database
- Fluoridation surveys: 2007, 2009, 2014 Database

***e. Public Water System that Adjust Fluoride Content—Health Care Provider***

***Notification:*** a system is in place to work with water systems to notify health care providers (i.e., dentists, pharmacists and physicians) when a new fluoridation system is initiated and when one is discontinued.

- Water system contacts the DOH

- DOH requests health care provider list from the Revenue and Fiscal Affairs Office
  - DOH provided medical and dental provider list for Charleston Water System in 2009 when plant was under major renovation and fluoride was ceased.

**f. Water Fluoridation Water System Survey**

- Results from the 2006- 2007; 2009 and 2014 surveys (Appendix 3).

**g. Water Fluoridation Technical Training:** the database contains the following information as it relates to the individuals who have received fluoridation training.

- State fluoridation specialists who have attended CDC’s Water Fluoridation Training.
- BOW sponsored CDC-based Water Fluoridation Training for state fluoridation specialists and water operators is a full-day course, with participants receiving continuing education credits.
  - Information specific to the water plant and equipment, including how to test water for fluoride, under the supervision of state personnel;
  - Reporting requirements to the state; and,
  - Information on public health benefits of fluoride and the role of water plant personnel in providing those benefits.

**h. Water Fluoridation: Education and Advocacy Training:** The database contains information related to all Education and Advocacy Training events conducted by the DOH, BOW and the SC Oral Health Advisory Council and Coalition Workgroups.

- Specific training information and participants
- Local Community Issues and Responses
- Community Education and Advocacy
- Workgroup Reports:
  - Technical Workgroup (BOW and DOH)
  - Education and Advocacy Workgroup
  - Advisory Council Policy Matrix

**i. Performance Measures:**

Strategy 4-5	COMPONENT 2
Performance Measures	Data elements in the database
<b>Cost effectiveness and impact of community FL</b>	Estimated averted decay and /or treatment costs attributable to water fluoridation
<b>% of people served by CWS who receive FL water</b>	# of people served by CWS # of people served by CWS who receive optimally fluoridated water
<b>Increase knowledge of the benefits of FL</b>	# of requests for scientific evidence on the safety of CWS # and location of communities where outreach occurred # of media placements promoting water fluoridation
<b>% of adjusted WS that maintain optimal fluoride levels annually</b>	# of adjusted WS with OPTIMAL fluoridation monthly #of adjusted WS

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## I. GOALS, OBJECTIVES AND ACTION PLAN

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The Water Fluoridation Objectives are based on the Healthy People 2020 objectives related to community water fluoridation and oral and craniofacial health surveillance systems.

**Background** – The DOH and the BOW have formalized their relationship within DHEC. Key staff members meet quarterly to address their shared fluoridated water agenda, fluoridation plan and any new emerging issues as related to water fluoridation.

The Education and Advocacy Coalition workgroup was formed at the December 2006 Quarterly Advisory Summit to address policy, advocacy and public education of fluoridated water. The group developed its objectives in February 2007. At the National Oral Health Conference in April 2008, the DOH Director presented a roundtable highlighting South Carolina’s development of internal and external partnerships for improving access to community water fluoridation. In 2013 the workgroup was re-organized and changed the name to Water Fluoridation Education and Training workgroup.

### 1. Goal

Increase the number of community water systems (CWS) that adjust fluoride at the 0.7ppm level (-+0.05), thus increasing the proportion of the population on public water that has access to fluoridated water at the optimal level of 0.7ppm along with the benefits that come from it.

### 2. Objectives (SMART)

#### ACCESS

- 1) By August 31, 2018, maintain the proportion of the population on public water systems with access to fluoridated water to 93 percent

**South Carolina:** Baseline (2013): 93 percent

Target (2018): 93 percent

**Measurement Type:** Impact

**Data Collection Method:** WFRS Report

- 2) By August 31, 2018, establish a baseline of the CWS that adjust below the 0.7 mg/L and increase the number of the CWS that adjust at 0.7 mg/L by 10%

**South Carolina:** Baseline (2015): TBD

Target (2018): 10 percent increase

**Measurement Type:** Process and impact

**Data Collection Method:** WFRS, DOH database

#### TECHNICAL ASSISTANCE AND TRAINING

- 3) By August 31, 2018, increase the number of water system operators/managers who have received Fluoridation 101 Training by 100 percent.

**South Carolina:** Baseline (2013): 10 water operators/ managers

Target (2018): 20 water operators/ managers

**Measurement Type:** Impact

**Data Collection Method:** Training database managed by DHEC

## **PUBLIC EDUCATION AND TRAINING**

- 4) By August 31, 2018, the Division of Oral Health will develop 12 communication strategies utilized to increase the knowledge of the benefits of community water fluoridation as well as to prevent the threat of elimination of fluoridation activities.

**South Carolina:** Baseline (2013): 0

Target (2018): 12

**Measurement Type:** Process

**Data Collection Method:** DOH Database and evidence of communication strategies

## **SURVEILLANCE**

- 5) By August 31, 2015, the Division of Oral Health will update the South Carolina Fluoridation Plan 2013-2018.

**South Carolina:** Baseline (2013): Fluoridation Plan 2009

Target (2015): Fluoridation Plan 2013-2018

**Measurement Type:** Outcome

**Data Collection Method:** DOH Database, publication on website

- 6) The Division of Oral Health will maintain a joint collaboration with the Bureau of Water by meeting at least three times on annual basis.

**South Carolina:** Baseline (2008-2013): 15 Quarterly Meetings

Target (2013- 2018): 15 Quarterly Meetings

**Measurement Type:** Process

**Data Collection Method:** Evidence by meeting minutes

- 7) The surveillance coordinator will complete an annual assessment of community water systems using the WFRS annually.

**South Carolina:** Baseline (2013): Annual WFRS Report

Target (2018): Five Annual WFRS Reports

**Measurement Type:** Process

**Data Collection Method:** Evidence of assessment, Annual WFRS Reports.

### **3. Action Plan**

See Appendix 4

### **4. Strategies to increase the number of CWS that fluoridate at 0.7ppm**

The chapter workgroups have developed strategies for achieving SOHP objectives, monitoring progress, addressing relevant public policy, and revising objectives through structured meetings conducted outside of the QAS. This structure allows DOH staff to monitor which objectives have been completed or are in need of revision or deletion. In attendance at each workgroup

meeting is a DOH staff person, SCOHACC members and technical support staff (e.g., evaluation consultant or epidemiologist).

Several strategies are developed to increase the number of CWS that fluoridate at 0.7 mg/L:

- a. Develop a listserv from each of the communities where “Fluoridation 101” training occurred.
- b. Provide a media release acknowledging all the water systems that received the CDC Water Quality awards.
- c. Provide fluoridation training to dental and medical providers, Head Start and child care staff and school nurses to reach patient and parents.
- d. Provide a comprehensive technical or educational training to individual CWS that adjust fluoride below the recommended level of 0.7 mg/L.
- e. Develop at least 12 communication strategies that will increase the knowledge of the population on the benefits of the CWF.

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## J. RESIDENTIAL WELL WATER TESTING FOR FLUORIDE PROGRAM

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### DHEC Fluoride Sampling Initiative for Private Wells

Environmental Quality Control (EQC) Laboratories and DOH have developed a program to facilitate testing for the presence of fluoride in private wells for children from 6 months of age to 8 years of age. The instructions for the program include:

#### Step 1: Determine the Eligibility for Free Testing of Fluoride:

- a. **Criteria:** Well water will be tested for fluoride at no cost for those who cannot afford to pay for the test and have children ages 6 months to 8 years of age living in the home.
- b. The health care provider will assess the need (i.e., patient is a Medicaid or WIC recipient, or not insured) of the patient/homeowner to receive free testing.
- c. Patients or homeowners who do not qualify for the free service may have their water tested for the presence of fluoride for a \$25 fee. The homeowner will be billed for the services.

#### Step 2: Sampling Bottles Information for the Public:

- a. Health care providers can obtain sampling bottles from the EQC Laboratories by contacting the DHEC Laboratory's Sample and Data Management Section at (803) 896-0860, or via e-mail at [Labhelp@dhec.sc.gov](mailto:Labhelp@dhec.sc.gov). If it is after hours or on the weekend, please call (803) 896-0857 and leave a message.
- b. ***Include the name of the homeowner/patient on the bottle with the water sample.***
- c. If necessary, sampling bottles can also be obtained from any regional EQC office/lab. To contact a regional EQC office, visit: [scdhec.gov/HomeAndEnvironment/DHECLocations](http://scdhec.gov/HomeAndEnvironment/DHECLocations)

#### Step 3: Sampling Instructions for the Public

- a. Sample Request Form DHEC 1905 (5/2005) can be obtained from the EQC Laboratory by calling (803) 896-0860, or via e-mail to [Labhelp@dhec.sc.gov](mailto:Labhelp@dhec.sc.gov).
- b. In the **comments section** of the Sample Request Form DHEC 1905, (*Request for Metals and Minerals Analysis of an Individual Residential Well or Lake Drinking Water System*), the health care provider should write:
  - DOH: Indicates free of charge.
  - DOH: Charge if the patient is not eligible for the free service.
  - If the provider would like to receive the test results, include the provider's contact information in the *Mailing Address* section of Form DHEC 1905, and the homeowner's contact information in the *Sample Address* section.
  - Secure the Sample Request Form DHEC 1905 around the water bottle sample with a rubber band, or put the completed form in an envelope and tape the envelope to the bottle.
  - The water sample must be tested within 28 days of collection but does not require any special preservation or refrigeration.

**Step 4: Delivery of Water Samples by the Public:**

- a. Water samples can be taken to a local public health center or a local EQC office to be delivered by the state courier to the EQC Central laboratory.
- b. Water samples can also be returned directly to the EQC laboratory at:

EQC-ARESD  
SC DHEC  
8231 Parklane Road  
Columbia, SC 29223

**Step 5: Test Results**

The test results will be mailed to the patient/homeowner unless the provider contact information is entered in the *Mailing Address* section of the Sample Request Form DHEC 1905 (See Step 3.2 above) and to DHEC DOH for input into the Fluoridation Program Database.

**For additional information about the DHEC Residential Well Water Testing Program,**

please access: [scdhec.gov/Environment/WaterQuality/ResidentialWells](http://scdhec.gov/Environment/WaterQuality/ResidentialWells)

Toll Free Telephone Number: 1-888-761-5989

Toll Free Fax Number: 1-888-761-6681

Section Manager: (803) 898-3376

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## K. REFERENCES

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Centers for Disease Control and Prevention (CDC). (September 29, 1995). *Engineering and Administrative Recommendations for Water Fluoridation*. MMWR, 44 (RR-13); 1-40.  
Access at: <http://www.cdc.gov/mmwr/preview/mmwrhtml/00039178.htm>

Centers for Disease Control and Prevention (CDC). (November 2014). *Fluoridation Basics*.  
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South Carolina Department of Health and Environmental Control (DHEC). (November 2014).  
*Bureau of Water: Drinking Water*. Website access at:  
<http://www.scdhec.gov/HomeAndEnvironment/YourHomeEnvironmentalandSafetyConcerns/DrinkingWaterConcerns/>

South Carolina Department of Health and Environmental Control (DHEC). (November 2014).  
*Division of Oral Health: Fluoridation*. Website access at:  
<http://www.scdhec.gov/Health/ChildTeenHealth/OralHealthforChildren/Fluoridation/>

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## **L. APPENDIX**

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1. Surface Water - Fluoride Addition Design Checklist
2. Ground Water - Fluoride Addition Design Checklist
3. Community Water System Survey 2014
4. Community Water Fluoridation Program: Action Plan

## **Appendix 1: Surface Water - Fluoride Addition Design Checklist**

Project: \_\_\_\_\_ System: \_\_\_\_\_ #: \_\_\_\_\_  
County: \_\_\_\_\_ Date: \_\_\_\_\_ Reviewer: \_\_\_\_\_

Must Comply with all Chemical Addition Requirements in addition to the following:

### Fluoride Specifications [R.61-58.3(D)(8)]

- \_\_\_\_\_ All chemicals added meet ANSI or NSF, Standard 60
- \_\_\_\_\_ All fluoride must conform to AWWA Standard B701, B702, B703

### Fluoride Compound Storage [R.61-58.3(D)(8)(a)]

- \_\_\_\_\_ All Dry chemical storage must be in accordance with [R.61-58.3(E)(2)(e)].
- \_\_\_\_\_ Hydrofluorosilic acid storage units must be isolated and vented to atmosphere.

### Dry Conveyors [R.61-58.3(D)(8)(b)]

- \_\_\_\_\_ Provisions must be made to minimize dust when transferring fluoride from shipping containers to storage units.

### Injection Point [R.61-58.3(D)(8)(c)]

- \_\_\_\_\_ If lime is added, the fluoride injection point must be downstream of the lime injection point.

### **Fluoride Feed Systems [R.61-58.3(D)(8)(d)]**

- \_\_\_\_\_ Scales or loss-of-wt recorders are required
- \_\_\_\_\_ Feed equipment (meters, etc) must be accurate to within 5 percent of any desired feed rate
- \_\_\_\_\_ If injection point is into a pipe, must be located in the lower half of the pipe, project upward at an approximately 40-degree angle, and extend into the pipe 1/3 of the diameter (*hydrofluorosilic acid only*)
- \_\_\_\_\_ All feed lines must be equipped with anti-siphon devices
- \_\_\_\_\_ Fail-safe system required to prevent continued feed of fluoride when no flow

### Protective Equipment [R.61-58.3(D)(8)(e)]

A minimum of the following:

- \_\_\_\_\_ 1 pair of rubber gloves
- \_\_\_\_\_ Respirator - NIOSH certified for toxic dust or acid gas (as necessary)
- \_\_\_\_\_ 1 apron or other protective clothing
- \_\_\_\_\_ Goggles/face mask
- \_\_\_\_\_ Other equipment deemed necessary by Department

### Dust Control [R.61-58.3(D)(8)(f)]

- \_\_\_\_\_ Provisions made for transfer of dry fluoride compounds from shipping containers to storage bins or hoppers in a way to minimize the quantity of fluoride dust which may enter the room in which the equipment is installed.
- \_\_\_\_\_ The enclosure must be provided with an exhaust fan and dust filter to the outside atmosphere of the building.
- \_\_\_\_\_ Provision for the disposal of empty bags, drums and barrels in a manner which will minimize exposure to fluoride dusts.
- \_\_\_\_\_ Floor drain provided.

## Appendix 2: Ground Water - Fluoride Addition Design Checklist

Project: \_\_\_\_\_ System: \_\_\_\_\_ #: \_\_\_\_\_  
County: \_\_\_\_\_ Date: \_\_\_\_\_ Reviewer: \_\_\_\_\_

Must Comply with all Chemical Addition Requirements in addition to the following:

### Fluoride Specifications [R.61-58.2(D)(7)]

- \_\_\_\_\_ All chemicals added meet ANSI or NSF, Standard 60
- \_\_\_\_\_ All fluoride must conform to AWWA Standard B701, B702, B703

### Fluoride Compound Storage [R.61-58.2(D)(7)(a)]

- \_\_\_\_\_ All Dry chemical storage must be in accordance with [R.61-58.2(E)(2)(e)].
- \_\_\_\_\_ Hydrofluorosilic acid storage units must be isolated and vented to atmosphere.

### Injection Point [R.61-58.2(D)(7)(b)]

- \_\_\_\_\_ If lime is added, the fluoride injection point must be downstream of the lime injection point.

### Fluoride Feed Systems [R.61-58.2(D)(7)(c)]

- \_\_\_\_\_ Scales or loss-of-wt recorders are required
- \_\_\_\_\_ Feed equipment (meters, etc) must be accurate to within 5 percent of any desired feed rate
- \_\_\_\_\_ If injection point is into a pipe, must be located in the lower half of the pipe, project upward at an approximately 40-degree angle, and extend into the pipe 1/3 of the diameter (*Hydrofluorosilic acid only*)
- \_\_\_\_\_ All feed lines must be equipped with anti-siphon devices
- \_\_\_\_\_ Fail-safe system required to prevent continued feed of fluoride when no flow

### Protective Equipment [R.61-58.2(D)(7)(d)]

A minimum the following:

- \_\_\_\_\_ 1 pair of rubber gloves
- \_\_\_\_\_ Respirator - NIOSH certified for toxic dust or acid gas (as necessary)
- \_\_\_\_\_ 1 apron or other protective clothing
- \_\_\_\_\_ Goggles/face mask
- \_\_\_\_\_ Other equipment deemed necessary by Department

### Dust Control [R.61-58.2(D)(7)(e)]

- \_\_\_\_\_ Provisions made for transfer of dry fluoride compounds from shipping containers to storage bins or hoppers in a way to minimize the quantity of fluoride dust which may enter the room in which the equipment is installed.
- \_\_\_\_\_ The enclosure must be provided with an exhaust fan and dust filter to the outside atmosphere of the building.
- \_\_\_\_\_ Provision for the disposal of empty bags, drums and barrels in a manner which will minimize exposure to fluoride dusts.

\_\_\_\_\_ Floor drain provided.

**Appendix 3: Community Water System Survey 2014**

DHEC Division of Oral Health  
Water Fluoridation Survey of SC Water Systems  
2014

**Part 1: Identification of Public Water System**  
*Please fill in the blanks below when applicable.*

<b>Information Item</b>	<b>2014 Information</b>
Lead Operator	
Facility Name	
Facility ID	
Facility Physical Address	
Facility City, State, Zip	
Water Operator Telephone	
Water Operator email	
System Type (ground or surface water)	
Number # of residents served in your <b>Primary population</b>	
Name(s) of Counties Served	
Names of Public Schools served  (If <i>ALL</i> Public Schools in a school district, name the district instead)  <i>*utilize separate sheet, if needed*</i>	
Names of Head Start Centers served	
Names of the consecutive water systems that you sell to	
Names of the water systems that you buy from	

**Part 2: Technical Information**

Please complete and check all boxes below that apply to your facility and fill in the blanks when applicable.

Information Item	2014 Information	
Fluoride product used in your water system	<input type="checkbox"/> fluorosilicic acid <input type="checkbox"/> sodium fluorosilicate <input type="checkbox"/> sodium fluoride	
Chemical feeder	<input type="checkbox"/> volumetric <input type="checkbox"/> gravimetric <input type="checkbox"/> other: _____	Year installed: _____
Pumps	<input type="checkbox"/> diaphragm <input type="checkbox"/> peristaltic <input type="checkbox"/> piston <input type="checkbox"/> other: _____	Year installed: _____
Fluoride Solution Tanks	Volume: _____	Year installed: _____
Fluoride Test Equipment	Type: _____	
Is continuous fluoride analyzer used?	<input type="checkbox"/> Yes, continuous fluoride analyzer is used <input type="checkbox"/> No, continuous fluoride analyzer is not used	
Is a scale used to weigh the fluoride?	<input type="checkbox"/> Yes, manual balance beam <input type="checkbox"/> Yes, digital load cell <input type="checkbox"/> No, a scale is not used at this facility	Year installed: _____
Latest inspection of the Fluoridation equipment performed	Frequency of the inspections :	Year performed:
What is the averaged monthly dollar amount of a residential customer's water bill for your service area?		
What is your system's annual cost for the fluoride chemical?		
Year when your system initiated water Fluoridation.		
Does the water system participate in split sampling?	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Does the water system anticipate the need to replace fluoridation equipment in the next couple of years?	<input type="checkbox"/> Yes <input type="checkbox"/> No	

**Part 3: Fluoridation Training**

Please complete and check all boxes below that apply to your facility and fill in the blanks when applicable.

Information Item	2014 Information	
How many water treatment operator positions are located at this water system?	Number of water treatment operator positions: . . . .	
Since 2009, how many of the current water treatment operators have received training on water fluoridation?	Number recently trained: . . . .	
Indicate the number of water treatment operators who have participated in each type of fluoride training.	No training: _____ On the job training: _____ CDC training: _____ DHEC - Bureau of Water training: _____ Other formal training with fluoride: _____ Name of training: _____	
Are water operators at your plant interested in receiving water fluoridation training?	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Has the community expressed interest in providing or receiving community water fluoridation information and/or education to the public?	<input type="checkbox"/> Yes <input type="checkbox"/> No	How many calls per month?

Please list names and contact information for water operators interested in receiving water fluoridation training.

NAME	ADDRESS and PHONE NUMBER
1.	
2.	
3.	
4.	

**Appendix 4: Community Water Fluoridation**

**Action Plan**

**Purpose:** To develop action steps for the implementation of the Water Fluoridation Action Plan by the Technical and Education & Training Workgroups consisting of Bureau of Water, Division of Oral Health and SCDA members.

**Goal:** To identify clear action steps and assign them appropriate staff with a timeline for completion.

**Current Activities:**

<b>What (Content)</b>	<b>How (Process)</b>	<b>Who (Leader)</b>	<b>WHEN (Timeframe)</b>	<b>Status</b>
DOH Water Fluoridation Communication Plan	<b>WF Communication Plan</b> <ul style="list-style-type: none"> <li>• Fluoridation Plan</li> <li>• Fluoridation Fact sheet               <ul style="list-style-type: none"> <li>○ Review fact sheet- members provide input</li> </ul> </li> </ul>			
Water Quality Awards	<b>Water Systems with 12 months optimal fluoridation</b> <ul style="list-style-type: none"> <li>• Dissemination Plan</li> </ul>			
Partnerships, Funding Opportunities, Collaborations	<b>USC RHRC</b> <ul style="list-style-type: none"> <li>• Eligible Water Systems</li> <li>• Fluoridation 101 Training</li> <li>• Community Level Data</li> </ul>			
Fluoridation Status	<b>WFRS Monthly Fluoride Level Reports</b> <ul style="list-style-type: none"> <li>• Monthly report</li> <li>• Issues and red flags               <ul style="list-style-type: none"> <li>○ Action steps:</li> </ul> </li> </ul>			
Fluoridation Program in the state	<ul style="list-style-type: none"> <li>• Fluoridation Plan</li> <li>• Goals and Objectives</li> <li>• Discrepancy Report</li> </ul>			
DOH Database	<ul style="list-style-type: none"> <li>• Database update</li> </ul>			
DOH WF Website	<ul style="list-style-type: none"> <li>• Page update</li> </ul>			
<b>Next Meeting</b>				