

Virginia Department of Health
Dental Health Program
Division of Child and Family Health



Community Water Fluoridation Program
Virginia State Plan 2012

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FREQUENTLY USED ACRONYMS

AAP - American Academy of Pediatrics (Virginia Chapter)

ADA - American Dental Association

AWWA - American Water Works Association

ASTDD - Association of State and Territorial Dental Directors

CDC - Centers for Disease Control and Prevention

CWF - Community Water Fluoridation

CWS - Community Water Systems

Coalition - Virginia Oral Health Coalition

EARWF - Engineering and Administrative Recommendations for Water Fluoridation

EPA - Environmental Protection Agency

FLUID - Fluoride Legislative User Information Database

FMSV1 - Fluoride Monitoring Systems for Virginia version 1

FRL - Free and Reduced Lunch program

HHS – Health and Human Services

ODW - Office of Drinking Water

PWS - Public Water System

SDWIS - Safe Drinking Water Information System

VDA - Virginia Dental Association

VDHP - Virginia Dental Health Plan

VRWA - Virginia Rural Water Association

WFRS - Water Fluoridation Reporting System

Virginia State Fluoridation Plan 2012

This fluoridation plan was prepared as a required activity as part of a Cooperative Agreement with the Centers for Disease Control and Prevention (CDC). The Virginia Fluoridation Plan outlines the background and extent of fluoridation activities in the Commonwealth of Virginia, including the current status of fluoridation, monitoring and surveillance, quality control, and the capacity to maintain and expand water fluoridation delivery.

1. Introduction

Community water fluoridation is the single most effective and efficient means of preventing dental decay in children and adults, regardless of race or income level. Water fluoridation has been recognized by CDC as one of ten great public health achievements in the 20th century. The Community Guide to Preventive Community Services reports community water fluoridation has been estimated to result in a 27% preventive fraction for tooth decay in adults. Decay rates measured before and after water fluoridation show a median decrease of 29.1% among children age 4 to 17 years when compared with control groups.

In 1948, the City of Portsmouth began plans to blend deep well water high in natural fluoride with surface water and in 1952 began production of optimally fluoridated water. In 1952, the Town of Fries and the City of Lynchburg were the first communities to begin water fluoridation in Virginia. The practice of fluoridation has increased to include 95% of the Virginia population on public water systems, or 6,089,335 people as of 2011.

Exposure to fluoride, either from water fluoridation or fluoride toothpaste, is credited as a primary factor responsible for reducing the prevalence of tooth decay in school age children. The CDC reports, "Despite being largely preventable, tooth decay is the most common chronic childhood disease in the U.S". Additionally, over 90% of adults in the U.S. have experienced dental caries. In the July 2008 CDC's report, *Populations Receiving Optimally Fluoridated Public Drinking Water*, it is stated that, "dental caries remains an important public health problem and that fluoridation is an equitable and cost-effective method of addressing the problem, even in smaller populations where the per-capita cost of fluoridation is higher".

The Virginia 3rd Grade Basic Screening Survey was completed during the 2008- 2009 school year. The sampling frame consisted of all public elementary schools with 3rd grade enrollment. With implicit stratification by race/ethnicity and percent of students eligible for the Free and Reduced Lunch program (FRL), a systematic probability proportional to size sampling scheme was used to select 200 schools. Eight calibrated dentists and dental hygienists completed the screenings using diagnostic criteria comparable to the Association of State and Territorial Dental Directors (ASTDD) 1999 Basic Screening Survey. Of the 15,191 eligible students, 7,838 were screened for a response rate of 52%. In the state, 34% of public elementary school students participate

in the FRL program; 29% of the students screened were eligible for FRL program. The estimates presented are adjusted for the sampling scheme. The survey concluded 49.4 % had sealants, 47.4 % had caries experience and 15.4% had untreated decay. The key findings from the National Health and Examination Survey, 2005-2008, showed “more than one in five people had untreated dental caries and 75% had existing dental restorations”.

According to the CDC, every dollar spent for community water fluoridation saves from \$8 to \$49 in treatment costs depending on the size of the community. Savings are greatest in large communities. Based on the national estimate that water fluoridation saves \$38 in dental treatment costs for every \$1 spent to fluoridate water supplies, fluoridated water saves more than \$4.6 billion annually in dental costs in the United States.

The Healthy Virginia’s 2010 national oral health indicator for water fluoridation is: “Increase the proportion of the population served by community water systems with optimally fluoridated water.”

2. Capacity to Meet Healthy People 2020 Objectives

The fluoridation objective is stated as follows:

Increase to at least 75% the proportion of people served by community water systems providing optimal levels of fluoridation by actively promoting fluoridation in larger communities (populations over 20,000) that are currently non-fluoridated

The Commonwealth of Virginia currently exceeds both the 2020 Healthy People Objective with 95% of the population on public water systems receiving fluoridated water. The ASTDD and the CDC have recognized Virginia for this achievement.

There are 143 public water systems (PWS) in Virginia that adjust the fluoride concentration in drinking water to an optimal level for oral health. Of these, Virginia has 57 water systems serving populations of less than 5,000 providing adjusted fluoridated water. Another 218 PWS are consecutive systems, purchasing water from systems that are fluoridated. Virginia has regions of naturally occurring fluoride primarily in the areas of the Northern Neck, Tidewater, and Western Tidewater areas resulting in 238 small water systems with natural fluoride serving approximately 155,000 people. In Virginia, 102 water systems have natural fluoride levels greater than 2 ppm or mg/L serving approximately 38,000 people. Also, 5 systems provide defluoridated water either through blending deep well water with surface water as in Portsmouth and Suffolk, or reverse osmosis systems as in the Town of Smithfield. The Town of Smithfield, in western tidewater, received a small grant from the Virginia Dental Health Program (VDHP) towards the project which was implemented in 2012. The Town of Smithfield now provides optimal levels of fluoride in the drinking water.

The VDHP maintains a list of communities that are non-fluoridated, and has categorized these by size and feasibility to fluoridate. In Virginia, this represents a very small population. Many of these systems have multiple well sites, no water works operators with a Class III license (or higher), cost limitations or infrastructure issues limiting the potential for fluoridation.

The VDHP promotes fluoridation in key communities that are currently not fluoridating and are considered priorities for expansion. Over the past several years, initiations have included Clifton Forge, Roanoke River Water Authority, Jarratt – Greensville County Water Authority, Onancock, Brookneal, New River Water Authority, Nelson County and Chase City. The Community Water Fluoridation (CWF) Coordinator annually contacts water system to offer grant assistance to initiate fluoridation, as well as, grants to upgrade existing fluoridation systems.

The VDHP has developed specific strategies to maintain and expand community water fluoridation as detailed in the Goals, Objectives, and Action Plan.

3. Laws and Regulations

The unanimous Virginia Board of Health policy statement of July 2008 renewed and expanded the December 13, 1951 Board of Health endorsement of Fluoridation.

The Board of Health Policy states:

- All public water systems in Virginia be optimally fluoridated, as community water is the most effective public health measure to prevent tooth decay.
- State and local government officials move in the direction of providing this health benefit for those citizens in localities where community water fluoridation is not already in place.

Virginia allows local municipalities to determine their fluoridation status. The Virginia Waterworks Regulations establish regulatory requirements on systems providing fluoridation. These are found in 12VAC5-590-930 Fluoridation and 12VAC5-590-860 Chemical application. (See Appendix A) The optimal level for fluoride in Virginia is established in the Waterworks Regulations. (See Appendix B)

The Virginia Department of Health Office of Drinking Water (ODW) provides regulatory oversight. ODW has two Working Memos #851 (most recently revised April 26, 2012) and Working Memo #268 (first established 1980) to provide monthly fluoride operational reports and sanitary survey inspection reports to the CWF Coordinator. (See Appendix C)

Local Ordinances:

Virginia does not mandate fluoridation; as such local ordinances are used to establish fluoridation requirements. Local ordinances and administration codes also apply to fluoridation activities. An important resource on fluoridation laws and regulations is the Fluoride Legislative User Information Database (FLUID) that is administered by the Children's Dental Health Project and the American University's Washington College of

Law with support from CDC. This database enables an electronic search of case laws, legislations, journal articles and related organizations. Searches can be conducted by city or state, or by free text search. Access to FLUID can be obtained at <http://fluidlaw.org/>.

4. Program Management

a. Administration/management

The ODW has specific authority to approve the use of water works in public water systems as specified by the State Safe Drinking Water Act of 1977, and ensure the delivery of safe drinking water to consumers under the State Rules for Safe Drinking Water. The ODW has the primary responsibility to enforce the requirements of the Federal Safe Drinking Water Act, and the regulations promulgated there by the United States Environmental Protection Agency (EPA).

The Virginia water fluoridation program requires cooperation by the staff of both the state dental and state drinking water programs. All state entities that have a role in water fluoridation will maintain communication regarding effective program implementation. The partnerships ensure that the public obtains the full health benefits and addresses safety and operational issues as delineated in Working Memo 581 and 268. (See Appendix C)

b. Personnel

The ODW is responsible for all regulatory over-sight of fluoridation systems pursuant to the Virginia Waterworks Regulations and in keeping with the Virginia Board of Health 2008 Policy Statement.

The CWF Coordinator is a full-time employee within the Dental Health Program. This position has the following duties: a) engage in fluoridation planning efforts, b) assist in the training of water treatment facility operators, c) provide monitoring and surveillance for all fluoridated water systems, d) promote water fluoridation, e) respond to technical concerns, f) serve as a liaison with other local, state and federal agencies on water fluoridation issues, and g) serve as a resource on the safety, efficacy, and cost effectiveness of fluoridation and h) resolve problems.

Water plant administrators and water operators oversee delivery of fluoride into the water supply, employing quality controls to assure optimal effectiveness and safety.

5. Quality Control

A Community Water System's (CWS) capacity to adjust fluoride in drinking water is based on its "technical, financial and managerial capacity to consistently produce and deliver water that meets Virginia's drinking water regulations."

a. Compliance with CDC Engineering and Administrative Recommendations for

Water Fluoridation (EARWF) recommendations:

The Virginia Waterworks Regulations promulgate the CDC EARWF and encourages all PWS that adjust fluoride to strive to comply with these standards. Standards can be viewed at:

<http://www.cdc.gov/mmwr/preview/mmwrhtml/00039178.htm> and as codified in the Virginia Waterworks Regulations.

b. Additives:

All PWSs in Virginia use fluoridation additives that meet National Sanitation Foundation specifications. Of the 143 of systems adjusting fluoride, 56 use sodium fluoride, 17 use sodium fluorosilicate, and 70 use fluorosilicic acid which serves the bulk of the population. Two water systems blend surface water with natural fluoride from deep wells to provide optimally fluoridated water and are monitored as adjusted systems to meet CDC Water Fluoridation Reporting System (WFRS) 2.0 considerations.

c. Facility inspection/on site program review:

The VDHP has two working memos with ODW to provide the results of inspections of community water systems used to evaluate fluoridation equipment needs. The monthly fluoride data, including the split sample information, is also used to evaluate fluoridation equipment needs. Partnerships with municipalities and the Virginia Rural Water Association (VRWA) augment knowledge of water treatment plant operations. The goal of the inventory is to:

- Establish a baseline database of fluoridation equipment in State CWS
- Update information in WFRS
- Assess current training status, needs and interests
- Evaluate interest of non-fluoridating water systems
- Build relationships with organizations/individuals serving State CWS
- Educate water systems and operators on optimal water fluoridation

The inspection information is matched with and used to update the data entered into WFRS. Data elements include water system contact information, fluoridation history, fluoride chemical, optimal target, laboratory testing, and operator training by the Virginia CWF Coordinator. Equipment surveys were completed in 2002, and updated in 2009. The survey information is updated using grant information, inspections reports and monthly fluoride operation reports. This information is stored per system in the Virginia Fluoride Monitoring System (FMSV1). The CWF Coordinator also provided assistance in 2010 to the American Water Works Association (AWWA) Fluoride Saturator Survey.

6. Education and training

a. Operator training:

A minimum of one hour of training in water fluoridation will be integrated into the basic certification training course for water treatment facility operators. This

lecture has been provided in video-conferencing formats and ODW Short School courses. The Short School Fluoridation Course is two hours of lecture. Fluoridation courses via video conferencing have been offered in the past to water works operators and are planned to resume in the Fall 2012 in cooperation with Virginia Tech EPA funded continuing professional education lecture series.

The annual Salem Water Fluoridation Course is an intensive two-day training. It addresses all aspects of water fluoridation including public health benefits, fluoride analyses, and technical requirements for various types of systems and testing procedures. Information is provided on fluoride additives, equipment, analysis, reporting, safety, and operations. The course offers credit toward continuing education requirements for water operator certification. It is also available to new ODW inspectors.

The course provides two hands-on laboratories and is structured on the CDC Basic Water Fluoridation Course. Developed in 2006, a Course Charter designates the partners from the ODW, the VRWA and the Salem Water Treatment Plant which houses the fluoridation equipment and provides classroom facilities. The Charter delineates roles and responsibilities in providing the course.

This training includes the following:

- i. Information specific to the water plant and equipment, including how to test water for fluoride
- ii. Reporting requirements to the state
- iii. Information on public health benefits of fluoride and the role of water plant personnel in providing those benefits
- iv. The importance of maintaining the optimal fluoride level

b. State staff training:

The staff involved with CWF in Virginia, including engineers, specialists and other VDHP staff, will attend CDC's water fluoridation training course or a similar course at least once. It is recommended that staff repeat the course once every 5 to 8 years while they remain in their position, if funding is available. According to Tom Reeves, the previous CDC National Fluoridation Engineer, "Virginia has the distinction of having the greatest number of ODW engineers completing the intensive three day hands on Basic Water Fluoridation Training". In February, 2012 two engineers attended the CDC Basic Water Fluoridation Training. Additionally, it is planned for two new engineers to attend the CDC Fall 2012 course.

c. Public health training:

Fluoridation courses via video conference have been successfully used to provide fluoridation lectures to dental professionals. Spokesperson training was provided in 2009 in cooperation with the Virginia Dental Association(VDA)/American Dental Association (ADA). The Virginia Oral Health Coalition (Coalition), in the 2011 Summit, included CWF education for medical and dental health professionals provided by leaders from Pew Center on States and from the Virginia Chapter of the American Academy of Pediatrics (AAP). The CWF coordinator provides a one- hour lecture on Community Water Fluoridation and Public Health. Over the past ten years, a range of fluoridation programs have been presented to public health clinicians.

d. Publications and other resource:

The VDHP maintains a repository of fluoridation materials including journal articles, fact sheets and promotional material. Copies of these materials are available upon request. The VDHP maintains and regularly updates the web site which includes publication material featuring VDHP developed materials. This information can be accessed at:

<http://www.vahealth.org/dental/communitywaterfluoridation/index.htm>.

Other resources for fluoridation information include the CDC web pages on fluoridation at: <http://www.cdc.gov/fluoridation/index.htm>, and Fluoridation Facts maintained by the ADA at:

http://www.ada.org/public/topics/fluoride/facts/fluoridation_facts.pdf.

Additionally, Virginia publications used to provide fluoridation updates include articles in VRWA Streamline magazine and VDA magazine. A CWF display was developed in 2004-05, and has been exhibited at several VRWA and AWWA meetings.

7. Surveillance Data

Data on water systems in Virginia are maintained by the CWF Coordinator. The WFRS database is made available to Virginia by CDC for administering water fluoridation activities and maintaining and reporting details about their water fluoridation program. Since 2002, Virginia maintains the following information in WFRS:

- Names of all fluoridated systems in the state
- Names of all consecutive systems in the state
- Names of all communities served by fluoridated and consecutive systems
- Population served by fluoridation
- Fluoridation start date
- Fluoride additive used
- Quarterly submission of fluoride data

Virginia maintains a separate data base, Fluoride Monitoring System (FMSV1), which allows for direct upload of split sample data, identification of new systems in Virginia Safe Drinking Water Information System (SDWIS), a read-only view of the water system data in Virginia SDWIS, and advance reporting functions. Advance reporting allows for multiple queries with multiple adjustable parameters, as well as, fixed annual reporting. FMSV1 is used to provide text files compatible with WFRS. The files are now sent via email attachments for upload to WFRS 2.0.

8. Monitoring

For water fluoridation to be effective in preventing tooth decay, the fluoride concentration must be kept within an optimal range. The optimal fluoride level in a community public water supply system is set by the Virginia Waterworks Regulations. Virginia ODW recognizes the proposed U.S. Department of Health and Human Services (HHS) guidelines for optimal fluoridation set at 0.70 mg/L. Many systems, particularly larger urban facilities have adopted the proposed optimal level of 0.70 mg/L. In Virginia, the CWF Coordinator and the Technical Director of the ODW have been working together to provide water system guidance regarding the new recommendations. Currently in Virginia, optimal fluoride level is 0.90 ppm fluoride, with an acceptable range from 0.6 ppm F to 1.4 ppm fluoride.

Water system personnel monitor daily fluoride levels in the water distribution system. Samples that will reflect the actual level of fluoride in the water system should be taken as set in the Virginia Waterworks Regulations.

At least once each month, water system personnel divide one sample and have one portion analyzed for fluoride by water system personnel and the other portion analyzed by either the state laboratory or a state-approved laboratory. The Virginia CWF Coordinator has provided 12 kits per water system for the purpose of split sample compliance for Regional Field Office I and II water systems. These areas represent the largest group of smaller water systems.

Each water system must send monthly fluoride operational reports to the ODW.

The report must include:

- The amount and type of chemicals fed and the total number of gallons of water treated per day;
- The results of daily monitoring for fluoride in the water distribution system; and
- The results of monthly split sample(s).

The calculated dosage should be cross-checked against the reported fluoride levels to spot chronic non-optimal operation.

The system's raw water source (i.e. water that has not been treated) should be analyzed annually for fluoride by either the state laboratory or a state-approved laboratory, or in accordance with state regulations.

The Commonwealth of Virginia requires that each month, the Division of Consolidated Laboratories or designated private laboratory will report to the respective water system about the results of monthly split or check sample test results taken from each adjusted fluoridated water system. The CWF Coordinator compiles and maintains the program information on community water systems and fluoridated status of drinking water in the state office using WFRS. The ODW staff forward monthly operator reports to the CWF Coordinator to collect, compile, and interpret. The monthly average, high and low fluoride levels, percentage of days tested, percentage of outliers and split sample data are entered for each adjusted PWS. The information entered into the WFRS system is available to develop reports that assist in monitoring water fluoridation activity and optimal quality.

Data entry for Virginia CWS began in 2001 and data has been entered for the years 2002-2012. Virginia fluoridation status is available to the public through two CDC websites, My Water's Fluoride, <http://apps.nccd.cdc.gov/MWF/Index.asp>, and Oral Health Maps, <http://apps.nccd.cdc.gov/gisdoh/default.aspx>. The CDC annual compliance award certificates recognize water systems that have successfully maintained monthly optimal fluoride levels and meet the monitoring requirements for all 12 months. The stringent monitoring guidelines for Virginia awards are:

- Monitoring daily fluoride level testing to assure it is conducted and recorded for at least 75% of the days of each month
- The average fluoride level must be between .8 and 1.4 parts per million
- Monitoring for outliers. No more than 20% of the daily findings will exceed the 0.8-1.4 range
- The dated monthly split sample correlates +/- .2 parts per million

In 2011, there were 28 systems meeting the Virginia criteria for awards.

The ODW is responsible for the regulation of all monitoring and sampling of daily fluoride levels at each entry point to the water system. The Commonwealth of Virginia is also responsible for requirements to be in compliance with the EARWF guidance.

The CDC Division of Oral Health enters water system information from the EPA SDWIS into WFRS for each state. This, along with data submitted by the State, is used to develop the National Fluoridation Report, which reports populations served by optimally fluoridated water at state and national levels. As part of the requirements of the CDC Cooperative Agreement, the VDHP forwards the WFRS Summary Report to CDC twice per year. WFRS report 2011 is located in Appendix E.

9. Promotion

The VDHP has the primary responsibility for providing community education on fluoridation practices. The VDHP, in partnership with the ODW and the VRWA, sponsors workshops and training sessions on fluoridation practices for public water suppliers and other interested persons, works with non-governmental organizations to promote community fluoridation for sound oral and dental health, and prepares and distributes promotional material highlighting the benefits of community water fluoridation. The VDHP and the ODW offer technical advice and assistance to fluoridating communities. In the past few years, the following localities have had challenges to fluoridation reviewed by local governance; Timberville (2009), Staunton (2009), Nelson County (2011), Blacksburg- Christiansburg (2011) and Albemarle/ Charlottesville (2012). In partnership with the VDA, the AAP, the Coalition, local public health directors, universities, and individual private practitioners, information on CWF safety, efficacy, cost-savings, as well as, addressing issues specific to the community was provided to these localities. These efforts resulted in votes to continue fluoridation in the localities.

10. Goals, Objectives and Action Plan

a. Goals:

- i. The overriding goal for fluoridation is to reduce the burden of dental disease for the citizens of Virginia through maintaining the proportion of the population served by community water systems with optimally fluoridated water.
- ii. The VDHP has the primary goal of water fluoridation to provide the benefits of optimal fluoridation of community water systems to meet the HP 2020 objective by December 2011.

b. Objectives:

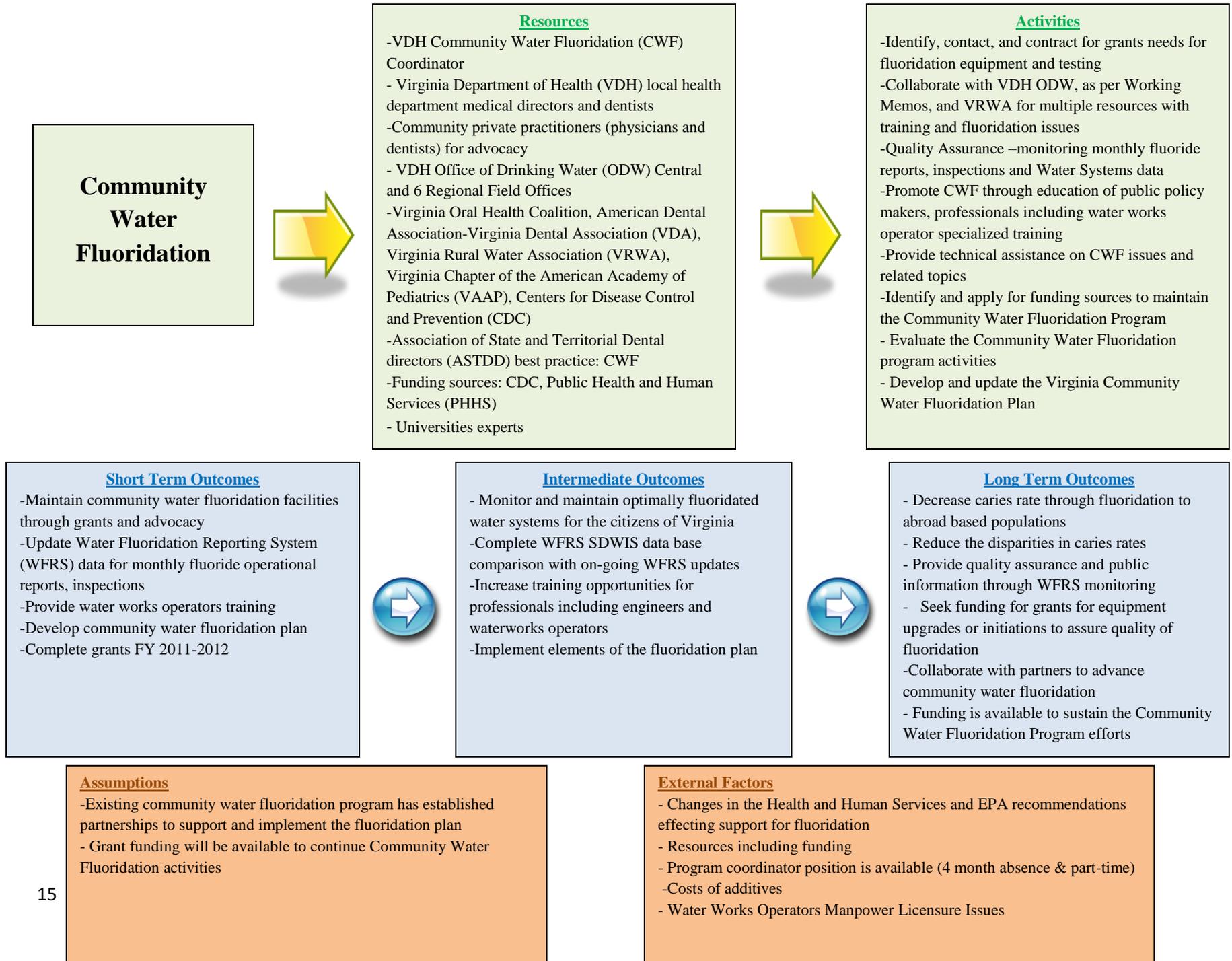
- i. By 2012, monitor compliance with the recommendations contained in EARWF
- ii. By 2012, assure annual training on community water fluoridation for water works operators and continue participation in the CDC Basic water Fluoridation Training for engineers pending funding
- iii. By 2012 complete annual (2012) WFRS SDWIS data comparison and update monthly data maintenance to provide accurate representations on My Water's Fluoride and Oral Health Maps
- iv. By 2014 maintain the CWF program activities through identification of and successful application for new funding sources
- v. By 2014, collaborate with the ODW to revise Water Works Regulations Appendix for fluoridation to be utilized by water systems throughout the state, based on the final HHS and EPA recommendations for optimal fluoride levels
- vi. By 2015, 95% of the population served by a water system will receive optimally fluoridated water

- vii. By 2015, complete a new equipment survey of all community water works based on the 2002 FMSV survey (form attached)

c. Action Plan:

- Promote optimally community water fluoridation through grant funding to initiate fluoridation, replace outdated equipment, assist with maintenance of fluoridation programs, and for testing/analysis of fluoride.
- Provide quality assurance of community water fluoridation through monitoring and surveillance.
- Work with ODW to analyze water systems in need utilizing the monthly fluoride operational reports, split sample data, and regular sanitation inspections.
- Maintain accurate data in WFRS through the collection, compilation and interpretation of the monthly operational data, community water systems and annual SDWIS WFRS data comparison for the provision CDC reports and public side information.
- Establish partnership with the Coalition and the VDA to work on fluoridation education for professional and advocacy issues.
- Provide technical assistance and information on community water fluoridation to municipalities, localities including regional field offices and local health departments and citizens of Virginia through multiple modalities including but not limited to attending public hearings, conference calls, and direct individual question and answers.
- Contact water systems in the Commonwealth of Virginia considering discontinuing fluoridation or that are off line for three consecutive months to assess community needs.
- Identify local community leaders to spearhead community campaigns
- Develop a system to notify health-care providers (i.e., local medical directors, public and private dentists, pharmacists, and private physicians) when a new fluoridation system is initiated or discontinued.
- Identify and apply for funding to support the CWF program activities.

Virginia Department of Health Community Water Fluoridation Logic Model



Appendix A

12VAC5-590-930. Fluoridation.

Where practicable and feasible, the board may require owners of waterworks to provide artificial fluoridation so as to bring the fluoride ion concentration to the optimum level as set forth in Article 1 of Part II.

A. Prior to the issuance of a permit for fluoridation, plans, specifications, operating procedures, and methods of supervision shall be submitted to the division. These shall be in conformity with requirements to be determined for each individual installation by the division.

B. Fluoride compounds. Commercial sodium fluoride, sodium silicofluoride and hydrofluorosilicic acid shall conform to the applicable AWWA standards. Use of other chemicals which may be made available must be approved by the division.

C. Fluoride compound storage. Compounds shall be stored in covered or unopened shipping containers in a separate room with the chemical feeder. The room must be provided with mechanical ventilation to the outside of the building.

D. Chemical feed installations.

1. Chemical feed installations shall conform to [12VAC5-590-860](#).
2. Scales and loss of weight recorders for dry chemical feeders and hydrofluorosilicic acid feeders shall be provided.
3. Feeders shall have accuracy so that the actual feed rate will be within 5.0% of the intended feed rate.
4. The point of application of hydrofluorosilicic acid, if into a pipe, shall be so located as to provide adequate mixing.
5. All fluoride feed lines shall be provided with adequate antisiphon devices.
6. The water applied to sodium fluoride saturator feeders shall be softened if hardness exceeds 75 milligrams per liter.
7. Unless otherwise approved, fluoride shall be applied to the raw water with the feeder paced by the raw water meter.
8. Provisions shall be made for venting hydrofluorosilicic acid carboys to the outside of the building when the carboys are in use.

E. Suitable protective equipment shall be provided which includes gloves, aprons, dust mask, and goggles.

F. Suitable equipment shall be provided for wetmopping and hosing dust that might accumulate in the plant. Dry feeders shall be equipped with bag loading hoppers.

G. Equipment shall be provided for measuring the quantity of fluoride ion in the water. Testing equipment shall be colorimetric or electrode type as approved by the division.

Statutory Authority

§ [32.1-12](#) and [32.1-170](#) of the Code of Virginia.

Historical Notes

Derived from VR355-18-009.09 § 3.30, eff. August 1, 1991.

12VAC5-590-860. Chemical application.

Only chemicals authorized in the construction permit or subsequently authorized by the division and in compliance with National Sanitation Foundation Standards 60 and 61 shall be used to treat drinking water or as an additive to drinking water.

A. Plans and specifications shall be submitted for review and approval, as provided for in Part I, and shall include:

1. Descriptions of feed equipment, including maximum and minimum feed ranges;
2. Location of feeders, piping layout, and points of application;
3. Storage and handling facilities;
4. Specifications for chemicals to be used;
5. Operating and control procedures; and
6. Descriptions of testing equipment and procedures.

B. Chemicals shall be applied to the water at such points and by such means as to:

1. Assure maximum efficiency of treatment;
2. Provide maximum protection to the consumer;
3. Provide maximum safety to operators;
4. Assure satisfactory mixing of the chemicals with the water;
5. Provide maximum flexibility of operation through various points of application, when appropriate;
6. Prevent backflow or back-siphonage between multiple points of feed through common manifolds; and

7. Provide for the application of pH-affecting chemicals to the raw water prior to the addition of the coagulant in turbidity removal processes.

C. Feed equipment.

1. Where chemical feed is necessary for the treatment of the supply, such as chlorination, coagulation or other essential processes:

- a. A minimum of two feeders shall be provided; and
- b. A standby unit or combination of units of sufficient capacity shall be available to replace the largest unit during shutdowns.

2. Feeders shall be of such design and capacity to meet the following requirements:

- a. Feeders shall be able to supply at all times the necessary amounts of chemical at an accurate rate throughout the range of feed;
- b. Proportioning of chemical feed to the rate of flow shall be provided where the water flow is not constant;
- c. Positive displacement type solution feed pumps, or gravity feed through rotometers, shall be used to feed liquid chemicals, but should not normally be used to feed chemical slurries; and
- d. Chemical solutions shall be prevented from being siphoned into the water supply by:
 - (1) Providing vacuum relief,
 - (2) Providing a suitable air gap, or
 - (3) Other approved devices or piping arrangements;
- e. The service water supply shall be protected from contamination by chemical solutions by:
 - (1) Equipping the supply line with backflow or back-siphonage prevention devices or
 - (2) Providing an air gap between supply line and solution tank;
- f. Chemical contact materials and surfaces shall be resistant to the aggressiveness of the chemical solution;
- g. Dry chemical feeders shall:

- (1) Measure chemicals volumetrically or gravimetrically;
- (2) Provide effective solution of the chemical in the solution pot;
- (3) Preferably provide gravity feed from solution pots; and
- (4) Completely enclose chemicals to prevent emission of dust to the operation room;

h. No direct connection may exist between any sewer and a drain or overflow from the feeder or solution chamber or tank; and

i. A separate chemical waste tank should be considered.

3. Chemical feed equipment:

- a. Shall be located near points of application to minimize length of feed lines;
- b. Shall be readily accessible for servicing and repair, and observation of operation; and
- c. Shall be located and protective curbing provided so that chemicals from equipment failure, spillage or accidental drainage shall not enter the water in conduits or treatment or storage basins.

4. Control:

- a. Feeders may be manually or automatically controlled with the automatic control reverting to manual control as necessary;
- b. The feeders shall be manually started following shutdown, unless otherwise approved by the division; and
- c. Automatic chemical dose or residual analyzers may be approved for use and shall provide alarms for critical values, and recording charts.

5. Solution tanks. All solution tanks shall be manufactured of materials suitable as a food contact surface:

- a. Means shall be provided to maintain uniform strength of solution, consistent with the nature of the chemical solution. Continuous agitation is necessary to maintain slurries in suspension;
- b. Two solution tanks of specific capacity may be required for a chemical to assure continuity of chemical application during servicing;

c. Each tank exceeding 30 gallons in capacity or fixed in place shall be provided with a drain.

(1) No direct connection between any tank or drain and a sewer shall be permitted.

(2) All drains shall terminate at least two pipe diameters, but not less than two inches, above the rim of the receiving sump, conduit, or waste receptacle;

d. Means shall be provided to indicate the solution level in the tank;

e. Make-up water shall enter the tank above the rim at a distance of two pipe diameters but not less than two inches;

f. Chemical solutions shall be kept covered.

(1) Polyphosphate solutions shall be disinfected by carrying a chlorine residual when added to unchlorinated water.

(2) Large tanks with access openings shall have such openings curbed and fitted with tight covers;

g. Subsurface locations for solution tanks shall:

(1) Be free from sources of possible contamination;

(2) Assure positive drainage for groundwaters, accumulated water, chemical spills, and overflows; and

h. Overflow pipes, when provided, shall:

(1) Be turned downward, with end screened;

(2) Have free discharge;

(3) Be located where noticeable; and

(4) Be directed so as not to contaminate the water or be a hazard to operating personnel.

6. Weighing scales:

a. Shall be provided for weighing cylinders at all plants utilizing chlorine gas; for large plants, indicating and recording type are desirable;

- b. Shall be required for fluoride solution feed in conjunction with a loss of weight recorder;
- c. Should be required for volumetric dry chemical feeders; and
- d. Shall be accurate to measure increments of 0.5% of load.

7. Feed lines:

- a. Shall be as short as possible in length of run and be:
 - (1) Of durable, corrosion resistant material;
 - (2) Easily accessible throughout entire length;
 - (3) Protected against freezing; and
 - (4) Readily cleanable.
- b. Shall slope upward from chemical source to feeder, when conveying gases;
- c. Shall introduce corrosive chemicals in such manner as to minimize potential for corrosion;
- d. Shall be designed consistent with scale forming solids depositing properties of the water, chemical solution, or mixture conveyed;
- e. Shall not carry chlorine gas beyond the chlorine feeder room unless the chlorine is under vacuum; and
- f. Shall be designed so that liquid alum does not mix with water prior to the point of application.

8. Service water supply:

- a. Water used for dissolving dry chemicals, diluting liquid chemicals, or operating chemical feeders shall be:
 - (1) Only from a safe, approved source;
 - (2) Protected from contamination by appropriate means;
 - (3) Ample in supply and adequate in pressure;
 - (4) Provided with means for measurement when preparing specific solution concentrations by dilution; and

(5) Properly treated for hardness when necessary.

b. Where a booster pump is required, duplicate equipment shall be provided and, when necessary, standby power.

c. Backflow prevention shall be achieved by appropriate means such as:

(1) An air gap between fill pipe and overflow rim of solution or dissolving tank equivalent to two pipe diameters but not less than two inches;

(2) An approved reduced pressure zone backflow preventer, consistent with the degree of hazard, aggressiveness of chemical solution, back pressure sustained, and available means for maintaining and testing the device; or

(3) A satisfactory vacuum relief device.

D. Chemicals.

1. Quality.

a. Chemical containers shall be fully labeled to include:

(1) Chemical name, purity and concentration;

(2) Supplier name and address;

(3) Precautions in handling; and

(4) Requirements of Virginia Department of Labor and Industry, Virginia Occupational Safety and Health Standards for General Industry, section 1910.1200(f).

b. Chemicals shall meet American Water Works Association standards, where applicable, and be stamped or certified accordingly.

c. Provisions may be required for assay of the chemicals delivered where the quality is in doubt.

d. Chemicals having a distinguishing color may be used, providing the coloring material is not toxic in concentrations used and will not impart taste, odor, or color to the water supply.

2. Storage.

a. Space shall be provided where at least 30 days of chemical supply can be stored in dry storage conditions at a location that is convenient for efficient handling unless local suppliers and conditions indicate lesser storage is adequate.

b. Cylinders of chlorine gas shall be:

- (1) Isolated from operating areas;
- (2) Restrained in position to prevent upset; and
- (3) Stored in rooms separate from ammonia storage.

c. Liquid chemical storage tanks shall:

- (1) Have a liquid level indicator; and
- (2) Have an overflow and a receiving basin or drain capable of receiving accidental spills or overflows.

d. Special precautions shall be taken with:

- (1) Sodium chlorite, to eliminate any danger of explosion; and
- (2) Activated carbon, which is a potentially combustible material, requiring isolated, fireproof storage and explosion proof electrical outlets, lights, and motors in areas of dry handling.

e. Chemicals shall be stored in covered or unopened shipping containers, unless the chemical is transferred into an approved covered storage unit.

f. Solution storage or day tanks supplying feeders directly should have sufficient capacity for one day of operation.

g. Acid storage tanks shall be vented to the outside atmosphere, but not through vents in common with day tanks.

3. Handling.

a. Provisions shall be made for measuring quantities of chemicals used to prepare feed solutions.

b. Storage tanks and pipelines for liquid chemicals shall be specific to the chemicals and not for alternates.

c. Chemicals that are incompatible shall not be fed, stored, or handled together.

d. Provisions shall be made for the proper transfer of dry chemicals from shipping containers to storage bins or hoppers in such a way as to minimize the quantity of dust which may enter the room in which the equipment is installed. Control shall be provided by use of:

- (1) Vacuum pneumatic equipment or closed conveyor systems;
- (2) Facilities for emptying shipping containers in special enclosures; or
- (3) Exhaust fans and dust filters which put the hoppers or bins under negative pressure.

e. Precautions shall be taken with electrical equipment to prevent explosions, particularly in the use of sodium chlorite and activated carbon.

f. Acids shall:

- (1) Be kept in closed, acid resistant shipping containers or storage units; and
- (2) Not be handled in open vessels, but should be pumped in undiluted form from original containers, through suitable hose, to the point of treatment or to a covered day tank.

g. Carts, elevators, and other appropriate means shall be provided for lifting chemical containers to minimize excessive lifting by operators.

h. Provisions shall be made for disposing of empty containers by an approved procedure which will minimize exposure to the chemical.

E. Housing.

1. Structures, rooms, and areas accommodating chemical feed equipment shall provide convenient access for servicing, repair, and observation of operation.
2. Floor surfaces shall be smooth and impervious, slip-proof and well drained with a slope of $\frac{1}{8}$ inch per foot, minimum.
3. Open basins, tanks, and conduits shall be protected from chemical spills or accidental drainage.

F. Operator safety.

1. Gases from feeders, storage, and equipment exhausts shall be conveyed to the outside atmosphere, above grade and remote from air intakes.

2. See [12VAC5-590-1000](#) for special provisions for handling and storing chlorine.
3. A plastic bottle of hydrochloric acid (muriatic acid in commercial form) shall be available for ammonia leak detection where ammonia gas is used or stored.
4. At least one pair of rubber gloves with long gauntlets, a dust respirator of a type approved by the Virginia Occupational Safety and Health Standards for General Industry, Section 1910.134 for toxic dusts, and an apron or other protective clothing shall be provided for each operator in any shift who will handle dry chemicals.
5. Rubber gloves, clothing protection, and goggles shall be provided for each operator preparing chemical solutions.
6. Facilities shall be provided for washing of the face, gloves, and protective equipment.
7. See [12VAC5-590-1000](#) E.

Statutory Authority

§§ [32.1-12](#) and [32.1-170](#) of the Code of Virginia.

Historical Notes

Derived from VR355-18-009.02 § 3.23, eff. August 1, 1991; amended, Virginia Register Volume 9, Issue 17, eff. June 23, 1993.

Appendix B

<http://leg1.state.va.us/cgi-bin/legp504.exe?000+reg+12VAC5-590-1280Z2>

APPENDIX B. BACKGROUND USED IN DEVELOPING THE CHEMICAL, PHYSICAL AND RADIOLOGICAL LIMITS OF THE DRINKING WATER STANDARDS

FLUORIDE

When the fluoride concentration in drinking water is maintained within the recommended ranges of 0.8 mg/L minimum and 1.0 mg/L maximum with the optimum being 0.9 mg/L, the consumer will realize a reduction in dental caries. When supplemental fluoridation is practiced, it is particularly advantageous to maintain a fluoride concentration at or near the optimum. The reduction in dental caries experienced at optimal fluoride concentrations will be diminished by as much as 50% when the concentration is 0.2 mg/L below the optimum. An approval limit slightly higher than the optimum can be tolerated without any mottling of teeth, so where fluorides are native to the water supply, these concentrations are acceptable. Higher levels should be reduced by treatment or blending with other sources lower in fluoride content. The U.S. Environmental Protection Agency has determined that the PMCL for fluoride is 4.0 mg/L based on long term toxicity data. The EPA has also determined that the SMCL for fluoride is 2.0 mg/L based on the potential formation of cosmetically objectionable dental fluorosis as a result of long term exposure. The level of the SMCL was based on a balancing of the beneficial and undesirable effects of fluoride.

Appendix C

Working Memo #851 and Working Memo #261

DATE: February 7, 2002, **Revised April 26, 2012**

TO: Office of Drinking Water Staff

FROM: Steven D. Pellei, PE, Acting Director
Office of Drinking Water

SUBJECT: SURVEILLANCE & REGULATIONS - Sanitary Surveys

REFERENCE: WM 844, WM 860, WM 908, WM 910, *R&R Users Guide*,
SDWIS Users Manual

Project Leader: Susan E. Douglas

References: EPA Sanitary Survey Guidance Manual for Groundwater Systems, Oct 2008
Guidance Manual for Conducting Sanitary Surveys of Public Water Systems;
Surface Water and Ground Water Under the Direct Influence (GWUDI) of
Surface Water, April 1999

Revision Highlights:

SDWIS update instructions (Section 6) have been modified to refer to the *SDWIS Users Manual*.

The minimum sanitary survey frequency for surface water and GUDI treatment facilities, operator compliance and monitoring & reporting elements has been reduced from 6 months to 12 months (Section 3, Table 1).

SUMMARY STATEMENT

This guidance in this memo provides procedures and forms to implement Sanitary Surveys. The Sanitary Survey is a core function of the Public Water System Supervision program implemented by the VDH-Office of Drinking Water. The Sanitary Survey of all waterworks is required by federal and state rules and regulations originating from the Safe Drinking Water Act.

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**ATTACHMENTS
(REPORT FORMS AND LETTERS)**

**These attachments are posted separately on the ODW server at
:\03-Memos\301-Active Working Memos\301.02-Forms Letters Manuals**

ATTACHMENT A: GROUNDWATER SYSTEM OWNER'S REPORT

ATTACHMENT B: GROUNDWATER SYSTEM INSPECTION REPORT

ATTACHMENT C: SURFACE WATER & GUDI SYSTEM INSPECTION REPORT

ATTACHMENT D: CONSECUTIVE SYSTEM INSPECTION REPORT

ATTACHMENT E: TRANSIENT NON-COMMUNITY (TNC) SYSTEM INSPECTION
REPORT

ATTACHMENT F: LIST OF POTENTIAL SIGNIFICANT DEFICIENCIES

ATTACHMENT G: TRANSMITTAL LETTER FOR SANITARY SURVEY REPORT
WITH SIGNIFICANT DEFICIENCY & CAP

ATTACHMENT H: TRANSMITTAL LETTER WITH NOV

ATTACHMENT I: MONITORING HISTORY - R&R REPORT INSTRUCTIONS

1. PURPOSE

Sanitary surveys performed by ODW staff are a vital part of our mission to ensure all people in Virginia have access to an adequate supply of affordable, safe drinking water that meets federal and state drinking water standards. A sanitary survey of every waterworks is required by the EPA, as the information gathered may be used to identify compliance with State and Federal regulations and to identify significant deficiencies requiring corrective action.

2. SCOPE

Safe drinking water depends on many factors. An adequate sanitary survey is categorized into **EIGHT ESSENTIAL ELEMENTS**. These elements are described below.

1. Source(s)

Surface Water: Includes intake structure and all valves and piping to WTP, and *associated pumping facilities*¹

Ground Water: Includes well, well casing, grout, valves, and piping to treatment plant (if treated) or to raw water tap (if not treated), *including the well pump*¹.

Spring: Includes spring box, controls, valves, *and associated pumping facilities*¹.

2. Treatment

Treatment is any chemical or physical processing of raw, applied to finished water that alters or enhances water quality in any way. This includes

- Chemical addition systems (chemical metering pumps, pumps for chemical feeders, day tanks, or chemical mixing tanks, and pumps for chemical transfer, etc.) to treat raw water or finished water anywhere in the system
- Aeration or agitation within the pipes or any vessel, pond, reservoir or basin
- Sedimentation, Adsorption or Exchange processes
- Filtration (including backwash and all appurtenances)

3. Distribution System

Includes all piping and appurtenances following the treatment plant (or entry point tap) to convey finished water to consumers. Includes air release valves, fire hydrants, yard hydrants, blow off valves, sampling stations, meters, isolation valves, backflow prevention devices (RPZ, etc.).

4. Finished Water Storage All finished water storage vessels following treatment include: clearwell, hydropneumatic tanks, atmospheric storage tanks, bladder tanks, etc.

5. Pumps, Pump Facilities and Controls Includes intermediate pumps, finished water pumps at the treatment plant and booster pumps in the distribution system.

6. Monitoring and Reporting (M&R) and Data Verification

Includes source and finished water quality data (bacteriological, physical, chemical, and radiological). Much of this element will be performed in preparation for the site visit, such as review of:

- a. Sampling Schedules
- b. Compliance sample results
- c. Violations and Public Notice Completion
- d. Monthly or quarterly Operation Reports
- e. Past Sanitary Surveys and Photos
- f. Submission of all required monitoring plans and reports
- g. Permits and Engineering Description Sheets

This task also includes all field sampling and data collection conducted by ODW during the sanitary survey for verification of performance (not compliance with the SDWA).

7. Management & Operations

Management and operations effect the overall water quality and reliability of the entire system. Some items that are included in this element are verification of:

- a. Corrective actions made in response to deficiencies cited, and all other recommendations from previous surveys.
- b. An effective cross-connection control program at the plant(s) and in the distribution system.
- c. Complaint history and response.
- d. Water loss and water audits performed. This includes an evaluation of the total amount of water produced/purchased vs. the total amount of water billed by the waterworks for revenue. AWWA recommends that routine water audits be conducted over a time period of at least 12 months. ODW has determined that >30% Leakage (Real Losses) to be a potential Significant Deficiency. More information on water loss terms and water audits can be found on the ODW server at:

:\06-Technical Resources\665-Water Accountability & Leakage

- e. Asset Management Programs. This process includes the assessment of the current state of facilities and equipment owned and operated by the waterworks, and planning and scheduling maintenance, repair, and replacement at the lowest appropriate costs. Although state and federal regulations currently do not require asset management programs, they are encouraged. EPA information available on their website:
 - Asset Management Best Practice Guide

- Check Up Program for Small Systems (CUPSS) – Asset management software
- Asset Management: A Handbook for Small Systems – STEP Guide Series
- Taking Stock of Your Water System: A Simple Asset Inventory for Very Small Drinking Water Systems
- Building an Asset Management Team
- Asset Management for Local Officials

Separate Capital Improvement Programs (CIP) may also be developed by waterworks or public utilities.

- f. Operational supplies
- g. Onsite laboratory
- h. Emergency Management Plan. Every community waterworks, including consecutive systems, must have a current Emergency Management Plan for Extended Power Outages, as required by the *Waterworks Regulations*. It must be kept current and be readily accessible. The waterworks must certify in writing to the appropriate ODW Field Office that they have completed the plan. Specific information required in the plan is described in the *Regulations*.

8. Operator Compliance

The qualifications of system personnel must match Water System classification including the number of personnel and coverage of personnel when out sick or on vacation, according to the *Waterworks Regulations* and DPOR requirements.

During the survey ODW staff should courteously and thoroughly question the operators to determine their knowledge of the facility and its processes, the operator's ability to reliably operate the waterworks, and the attention paid to process control and maintenance. Performance of field tests is encouraged and results of those tests should be noted in the report.

3. FREQUENCY OF SURVEYS

All of the eight elements are necessary for a thorough survey, but not all elements may be necessary or evaluated at each survey. This is particularly true when surveys are conducted at very frequent intervals. Many of the elements, however, need to be evaluated at every survey. Completed element evaluations will be documented on written sanitary survey reports and in the State Drinking Water Information System (SDWIS) database.

The Interim Enhanced Surface Water Treatment Rule and the Ground Water Rule require States to complete sanitary surveys for all surface water systems, groundwater systems, and groundwater under the direct influence of surface water (GUDI) systems.

ODW has established sanitary survey schedules based on water source, treatment provided, and waterworks classification. No element shall be surveyed less than every 3 years. ODW's minimum sanitary survey frequency schedule is included in Table 1.

TABLE 1

MINIMUM SANITARY SURVEY FREQUENCY ESTABLISHED BY ODW, Months

(Report Template Section Shown in Parentheses)

ELEMENT:	1	2	3	4	5	6	7	8
WW TYPE	Source	Treatment	Distribution	Storage	Pumps	M&R	Mgmt	Operator
W, no Treatment	24 (Part II)	N/A				24 (Part I)	24 (Part I)	24 (Part I)
GW, 4-log Virus Treatment req'd	12 (Part II)	12 (Part II)	36 (Part I)	36 (Part II)	36 (Part II)	12 (Part I)	12 (Part I)	12 (Part I)
GW, other Treatment	18 (Part II)	18 (Part II)				18 (Part I)	18 (Part I)	18 (Part I)
SW & GUDI	12 (Part II-B)	12 (Part II-A)	36 (Part II-B)	36 (Part II-B)	36 (Part II-B)	12 (Part I, II-C)	36 (Parts II-C, II-D)	12 (Part I)
Consecutive	N/A	36 (Part II)	36 (Part I)	36 (Part II)	36 (Part II)	36 (Part I)	36 (Part I)	36 (Part I)

To insure that all eight Elements have been surveyed for each waterworks during any three year interval, a database query and reporting tool will be provided.

4. SANITARY SURVEY PROCESS

The procedures needed to perform a Sanitary Survey are depicted in section 4.3 Sanitary Survey Process Flow Diagram. These major activities are included: scheduling, file and database review, field inspection, survey report completion, supervisor review including verification of Significant Deficiencies and Violations, and database updates.

4.1. Imminent Health Threats

During the course of a site visit, if the inspector believes that the waterworks is under an imminent health threat (e.g. one or more barriers have been compromised, and chemical or microbial contamination is believed to be occurring), then the inspector must contact his/her supervisor to discuss the situation and decide on an appropriate course of action. Findings that may indicate an imminent health threat include:

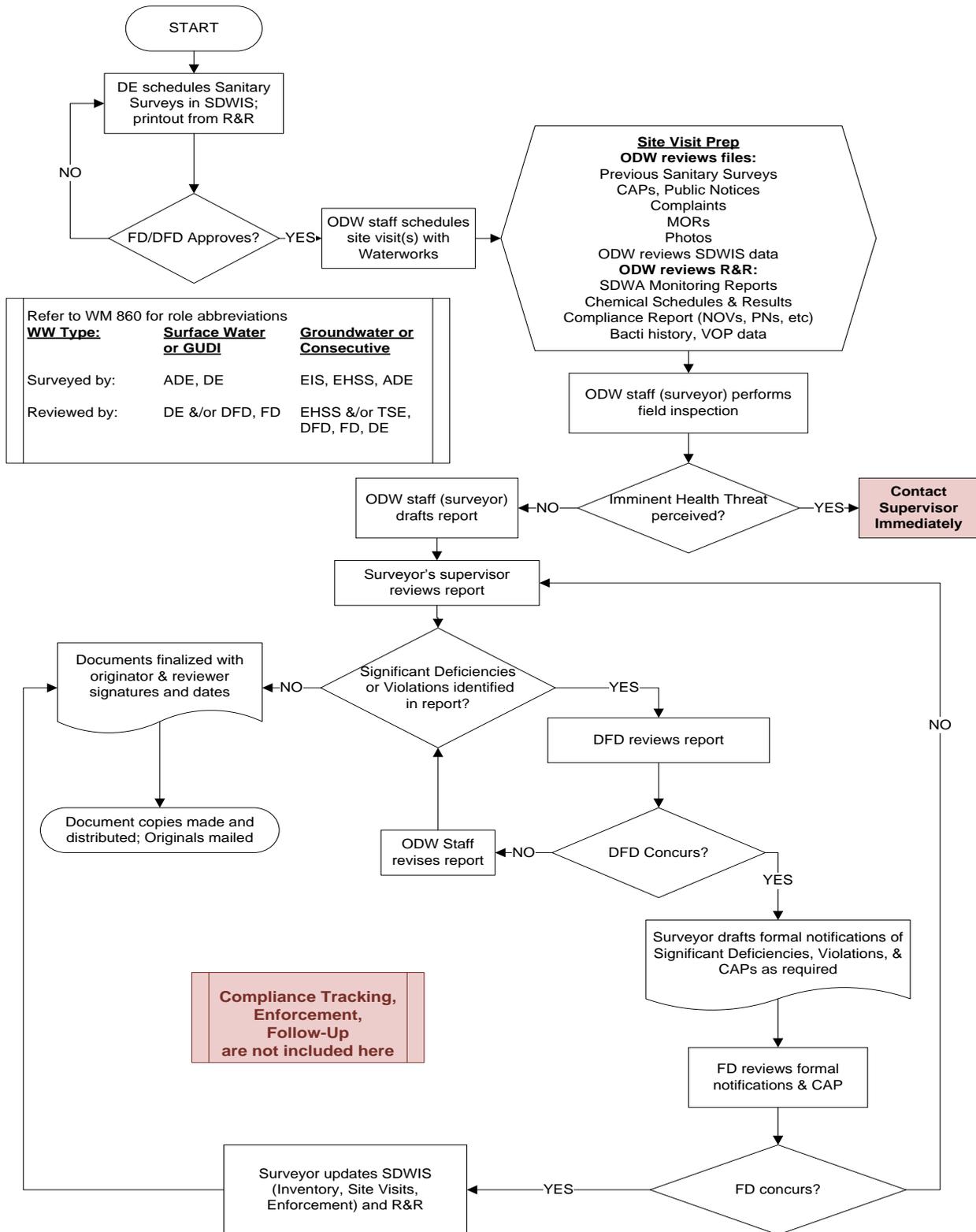
- Well flooding/ surface water intrusion
- Contamination of source or finished water from a chemical spill or cross-connection
- Unapproved use of a groundwater source without acceptable water quality data
- Zero or negative system pressure
- Major water main break/interruption
- Inadequate disinfection / log inactivation not achieved / minimum chlorine residual not maintained
- Elevated filtered water turbidities
- Unprotected openings in finished water tanks with evidence of contamination (intrusion by birds, insects, etc.)

If the Field Director and Local Health Director support the issuance of a Special Notice, the inspector should assist the waterworks with preparation of the notice. The inspector should provide technical assistance on site to correct the problem, whenever possible. Depending on the severity of the situation, the inspector may need to end the inspection and schedule a follow-up site visit.

4.2. Safety Concerns

The inspector shall not enter confined spaces or climb elevated structures such as tanks. The inspector must use other methods and devices, such as binoculars, mirrors and lighting, to make field observations.

4.3 Sanitary Survey Process Flow Diagram



SANITARY SURVEY REPORTS

The attached sanitary survey report forms are for use in conducting and reporting the results of sanitary surveys.

The forms have been designed to

- provide uniformity of surveys,
- ensure completeness of the surveys,
- facilitate recordkeeping and SDWIS updates,
- allow follow-up surveys by other staff if necessary,
- provide owners/operators with a separate and concise notification of deficiencies,
- motivate owners/operators to take corrective action for recommendations,
- develop a Corrective Action Plan, if a significant deficiency exists, and
- provide a record for future surveys, for emergency situations, or when technical assistance is needed.

Part I of the report template is mandatory and shall not be modified. The subsequent sections are generated from field visits and may need to be customized for the particular waterworks surveyed.

If the template does not provide sufficient space, then place numbers in boxes where comments are required, and write the comments at the bottom of the page or on another sheet, to be included with the report.

The report can be brief or as detailed as necessary, with extra sheets added for narrative, to convey to the owner the deficiencies that exist. If the written report differs from the on-site discussion during the survey, the owner/operator must be phoned to notify of the change(s) and the reason(s).

5.1. Groundwater Systems Owner's Report or Transmittal Letter

The owner's report has been tailored to stand on its own without the full Sanitary Survey report. It includes minimal background information: date and type of survey, a listing of those in attendance, the next scheduled samples, and next scheduled inspection, and the most significant comments/findings. A template is provided in Attachment A.

Alternatively, the full sanitary survey report may be sent to the owner with a transmittal letter. If a Significant Deficiency is found during the Sanitary Survey, then the full report (Parts I and II) must be sent with a Significant Deficiency notification letter and Corrective Action Plan, as

shown in Attachment G. If a violation is found during the Sanitary Survey, then the full report (Parts I and II) must be sent with the violation notice, as shown in Attachment H.

5.2. Groundwater Systems Part I - System Background

This section of the sanitary survey report reflects Essential Element numbers 6, 7, and 8.

A template is provided in Attachment B and includes the following:

- General Information
- Compliance History
- Monitoring History

Completion of this section is mandatory. "Compliance History" is self-explanatory and should be completed before conducting the field inspection. Compliance dates may be obtained by running the R&R "System Data Dates" report. "Monitoring History" should be generated from R&R "Chemical Schedule" reports. See Attachment I for instructions to generate the Monitoring History report from R&R and paste into the sanitary survey report.

5.3. Groundwater Systems Part II – System Survey Information (Field Notes)

This portion of the report is intended to be used during the onsite review of the water source, facilities, equipment, operation, and maintenance of the waterworks. A template is also provided in Attachment B, and includes forms for wells and spring sources, and typical groundwater treatment processes.

In cases where other treatment processes are present, the staff will need to develop their own process-specific checklist(s) for inclusion in the survey report. The list(s) should follow the general format of that for fluoridation, including a review of the past 12 months' operation reports to determine effectiveness of treatment, questions pertaining to potential health threats (usually cross-connection control), physical facilities required by the *Waterworks Regulations*, and operational considerations. The staff should consult with the Deputy Field Director to assure that the pertinent items are included in the lists, and shared with other field offices as well as the Central Office for inclusion in future revisions to the template(s).

Staff are encouraged to take digital photographs of the facilities, and prepare piping diagrams or schematics. This information can be valuable to the staff in finalizing the survey report. It may also be an important future reference and may be incorporated into the Engineering Description Sheet of the Waterworks Operation Permit. Photos and schematics should be copied into the correspondence file after each inspection.

Performing field tests such as chlorine residual, pH, alkalinity, hardness, iron, manganese, etc. should be considered during surveys of most groundwater systems. Field tests may also be warranted during a complaint investigation, when requested by the owner/operator, or for the purpose of evaluating a treatment process. If the owner's report is prepared, then include the results of all field tests; otherwise document the results with the inspection form of the related waterworks facilities.

Problem solving must be approached systematically. Only after a thorough evaluation of all system components is completed, should recommended actions be reported to the owner/operator. Staff with limited experience or simply unable to confidently interpret the survey findings should defer to more experienced ODW staff for resolution.

5.4. Sanitary Survey Format for Surface Water and GUDI Source Waterworks

The sanitary survey report forms in Attachment C are for use in conducting and reporting the results of sanitary surveys performed at waterworks served by conventional surface water plants and membrane systems, excluding Reverse Osmosis.

This report form is designed to cover both performance of the physical facilities and the operational and managerial institutions which govern the facilities. The purpose of the form is to provide a means to look at the necessary unit processes at the treatment plant and at associated facilities elsewhere, and to look at the programs which need to be in place to ensure proper operation, maintenance, planning and funding of those facilities on an on-going basis.

5.5. Surface Water Systems Part I - System Background & Findings

This part includes the following topics, which are researched and completed *before* the field inspection:

- Capacity information
- Operation reports status
- Complaints summary
- Monitoring History
- Compliance History
- Enforcement Actions
- VOP performance

Following the sanitary survey the findings (especially deficiencies) are summarized in this section. It is recommended that the VOP performance summary from R&R be printed and shared with the Designated Operator (DO) during the routine site visit.

5.6. Surface Water Systems Part II - A

This part includes field observations on the following topics:

- Unit Process Evaluations (Treatment)
- Finished Water Facilities (Clearwell)

5.7. Surface Water Systems Part II - B

This part includes field observations on the following topics:

- Raw Water Intake / Surface Source Evaluation
- Spring Source Evaluation (if declared GUDI)
- Source Water Assessment and Protection

5.8. Surface Water Systems Part II - C

This part includes field observations on the following topics:

- Distribution System Evaluation
- Cross Connection Control Program
- Distribution Storage
- Distribution Pump Station(s)

5.9. Surface Water Systems Part II - D

This part includes the following topics:

- System Management & Operations
- Financial

5.10 Sanitary Survey Report for Consecutive & TNC Systems

Consecutive system sanitary surveys may include up to seven of the eight Essential Elements:

1. Distribution System
2. Finished Water Storage
3. Pumps, Pump Facilities and Controls

these are found in Part II

- 4. Monitoring & Reporting and Data Verification
 - 5. Water System Management and Operations
 - 6. Operator Compliance
 - 7. Treatment - this would be added to Part II
- These are found in Part I*

A template for a consecutive waterworks sanitary survey report is provided in Appendix D. One for TNC waterworks is provided in Appendix E.

6. SDWIS UPDATE

Upon completion of the sanitary survey report, the SDWIS - “Site Visits” module must be updated. Refer to the *SDWIS Users Manual* for specific data entry instructions.

7. DISTRIBUTION OF SANITARY SURVEY REPORTS

The entire report form for surface water and GUDI systems will be forwarded to the waterworks owner and to operations supervisor. For groundwater systems, the owner and/or operations supervisor may receive a full copy

of the inspection report or a copy of the Owner’s Report. **The ODW Central Office shall receive complete sanitary survey reports.**

A special copy of the Owner’s Report (or letter to owner or opening/summary section) **plus** only the appropriate evaluation sheets (unit process review sheets) for fluoridation systems shall be sent to the Division of Dental Health for **all** waterworks which practice fluoride adjustment, whether groundwater or surface water. The copy shall be sent to:

cc: VDH – Division of Dental Health, Fluoridation Coordinator

For all federally-owned waterworks, a copy of the opening/summary section of the report or the owner's letter is to be mailed by the field office to:

Federal Facilities Program (3EC00)
Office of Enforcement, Compliance and Environmental Justice
US Environmental Protection Agency, Region 3

1650 Arch Street
Philadelphia, PA 19103
Phone: (215) 814-2148
Fax: (215) 814-2905

All sanitary survey reports shall be written, reviewed, and sent out of the Field Office within 30 calendar days of the survey.

8. SIGNIFICANT DEFICIENCIES

Significant Deficiency means any defect in a waterworks' design, operation, maintenance, or administration, as well as any failure or malfunction of any system component that may cause, or have the potential to cause, an unacceptable risk to health or that could affect the reliable delivery of safe drinking water.

All Significant Deficiencies identified by ODW staff during sanitary surveys must be corrected. A list of potential Significant Deficiencies is provided in Attachment F. (This list is also provided in SDWIS to facilitate data entry of Significant Deficiencies.) The list represents several possible Significant Deficiencies for waterworks but cannot account for all of the possible Significant Deficiencies for all waterworks. ODW staff may also determine event-specific Significant Deficiencies as appropriate.

If a staff member performing a sanitary survey observes one of these deficiencies, concurrence must be obtained from the Deputy Field Director prior to finalizing the report and formally notifying the waterworks owner. The observed deficiency shall be subject to the following questions in order to confirm that it is a Significant Deficiency:

- Does the deficiency cause the potential for acute and chronic contaminants to be introduced into the drinking water?
- If left uncorrected will the deficiency cause the potential for the introduction of contaminants into the drinking water at some time in the future, that has the potential for acute or chronic health effects?
- Does the deficiency affect treatment in a manner that increase the potential risk to public health?
- Does the deficiency cause the introduction of contaminants into the drinking water, that has the potential for acute or chronic health effects?

Within 30 days ODW must notify the waterworks owner in writing of a confirmed significant deficiency, as well as sending a full copy of the sanitary survey report. Use the sample Significant Deficiency notification letter and Corrective Action Plan in Attachment G. If a Significant Deficiency exists, then Corrective Action is required.

9. CORRECTIVE ACTION PLANS

Draft Corrective Action Plans (CAP) will usually be generated by ODW staff and included with the formal notification of a significant deficiency. The transmittal letter must inform the waterworks owner to review, sign and return the proposed CAP within 45 days. The waterworks owner may revise the proposed CAP (with ODW review and approval) or develop an owner generated CAP (see below). The CAP will include a list of specific activities, along with a schedule, to correct any significant deficiencies. CAPs are enforceable schedules of compliance and must include the following:

1. A statement of the deficiency
2. The action(s) necessary to correct the deficiency
3. Detailed schedule with begin dates and deadlines for each step to correct the deficiency
4. A statement that the waterworks will notify the appropriate field office, in writing, within 30 days of completing individual scheduled actions.

Corrective Action Plans may include the following:

1. Proposed interim measures to prevent a recurrence
2. Source of funding, if necessary

3. Any follow-up actions

If the waterworks owner desires to develop the CAP, field office staff must advise the waterworks owner that:

- A 30 day period to consult with ODW regarding the Corrective Action(s) is allowed and
- A subsequent 15 day period to submit to ODW a written CAP is also allowed.

CAPs will be given the highest priority for review as they address a potential threat to public health. CAP submittals will be acted on within 30 days of receipt. CAP action items and associated completion dates must be logged in SDWIS for compliance tracking.

10. CORRECTIVE ACTION PLAN FOLLOW-UP

Within 120 days of receiving written notification of a Significant Deficiency, the waterworks owner must complete all Corrective Actions or be in compliance with the schedule of activities in an approved CAP. Waterworks owners should complete CAP corrective action(s) within 120 days. Failure to complete Corrective Actions or meet individual approved schedule deadlines is a Treatment Technique violation. However, if reasonable events preclude the meeting of a deadline, the CAP may be revised, and no violation would be incurred.

The waterworks owner must notify ODW within 30 days of completing any required Corrective Actions. Logging of all deadlines for actionable items must be done in SDWIS for tracking purposes.

Onsite inspections will be conducted by Field Office staff after notification from a waterworks that a CAP has been completed. The inspection must be conducted within 30 days of notification from the waterworks. A written report of the inspection will document and inform the waterworks of ODW's concurrence or non-concurrence with the waterworks that the completed corrective action(s) meet(s) the intent of the CAP.

11. SIGNIFICANT DEFICIENCIES AND VIOLATION NOTICES

Virginia Administrative Code (VAC) violations that have also been identified as Potential Significant Deficiencies are listed in Table 2.

TABLE 2

SIGNIFICANT DEFICIENCIES AND VAC VIOLATIONS

VAC Violation (WM 908)	Significant Deficiency
B1 – Failure to Follow Approved BSSR or TSWMP	MR04 – Sampling not in accordance with BSSR
B2 – Lacks Properly Licensed Operator	OC01 – Number and Class of Operators do not meet WW Regulations
C6 – Less Than 20 psi at Service Connection	DS01 – Distribution pressure falls below 20 psi
C3 – Reliability problem; examples in WM 908 Attachment 2:	
<ul style="list-style-type: none"> • Failure to reliably maintain treatment or chemical addition – chlorination 	<p>TR05 – Failure to maintain continuous disinfection</p> <p>TR06 – Minimum chlorine residual not maintained to meet CT</p> <p>TR07 – Entry point chlorine residual < 0.2 mg/L</p>
<ul style="list-style-type: none"> • Failure to reliably maintain treatment or chemical addition – corrosion control 	TR11 – Inadequate continuous treatment
<ul style="list-style-type: none"> • Failure to maintain infrastructure – well seal 	SO04 – Sanitary seal or pitless adapter well cap missing or defective
<ul style="list-style-type: none"> • Failure to maintain infrastructure – storage tanks 	<p>FW01 – Tank not watertight</p> <p>FW02 – Roof/Access hatches not watertight</p> <p>FW03 – Tank structurally unsound</p> <p>FW04 – Vent improperly screened</p> <p>FW05 – Overflow improperly screened or protected from contamination</p> <p>FW06 – Drain improperly screened or protected from contamination</p>
<ul style="list-style-type: none"> • Failure to maintain infrastructure – distribution system 	DS03 – Distribution leakage rate > 30%

When a VAC Violation is identified in the sanitary survey, it should be issued, per WM 908. When the Deputy Field Director confirms that the item is also a Significant Deficiency, then the Significant Deficiency data must be entered into SDWIS, and “associated” to the violation.

If the waterworks is non-compliant with the Corrective Action Plan because it fails to meet a schedule deadline or resolve a corrective action to the satisfaction of ODW, a Treatment Technique violation has occurred. Refer to the [SDWIS Users Manual](#) for further instructions.

Treatment technique violations require a Tier 2 Public Notice. Public Notice templates (Tiers 1, 2 and 3) are provided on the ODW server at [\\Odwsrv1\odwshare\13-Public Notice & NOV Templates](#)

END OF MEMO

WORKING MEMO 268

DATE: July 15, 1980, **Revised February 11, 2011**

TO: Office of Drinking Water Staff

FROM: J. Wesley Kleene, PhD, PE, Director
Office of Drinking Water

SUBJECT: SURVEILLANCE & REGULATIONS - Monthly Reports on Fluoridation

Waterworks Monthly Operation Reports

In cooperation with the Dental Health Program, please continue to forward a copy of all fluoridation monthly operational reports to Dr. Lisa Syrop, Dental Health Program Fluoridation Coordinator. The data from the reports is compiled for monthly reports to the Centers for Disease Control and Prevention (CDC) Water Fluoridation Reporting System (WFRS) and used to determine the CDC Annual Fluoridation Compliance Awards for waterworks systems. Data fields monitored for fluoride include: monthly average, monthly high, and monthly low values, percentage of days testing, percentage of outliers, split sample operator value, split sample lab value, date of sample and chemical type.

The monthly operational reports are also used to assess fluoridation grant needs, and confirm populations served. Please forward private lab split sample data to Dr. Syrop at Lisa.Syrop@vdh.virginia.gov or 109 Governor Street 9th Floor Richmond, VA 23219.

Waterworks Sanitary Survey Report

Please also forward a copy of each Sanitary Survey report section on fluoridation to Dr. Syrop. This data is reported in the Dental Health Program Fluoride Monitoring System 1 (FMS1.) The evaluations and recommendations of ODW Engineers are used for short and long term fluoridation grant writing and planning for infrastructure replacement. This information has been important in estimating requests for additional funding. It is also helpful in maintaining accurate information on the Dental Health Program's website.

END OF MEMO

Appendix D

Survey Form

Annual Fluoride Survey

SYSTEM: HILLSVILLE, TOWN OF
PWS ID: 1035295

CONTACT PERSON:PHONE #:

FLUORIDATION STATUS:ADJ CO DEF NAT NON VAR
CHEMICAL TYPE:POPULATION SERVED:
FLUORIDATION START DATE: / / LAST
FLUORIDE TRAINING DATE: / /
LAST INSPECTION DATE: / / FLUORIDATION STOPPED: / /
Fluoride Criteria Defluoridated Criteria
NATURAL FLUORIDE CONC.: mg/L DEFLUORIDATED MONITOR:
OPTIMAL FLUORIDE mg/LDEFLUORIDATED TARGET: mg/L
LOWEST OPTIMAL CONC.: mg/L
HIGHEST OPTIMAL CONC.: mg/L Variable/Other Criteria
SPLIT +/- TOLERANCE: mg/L
NUMBER OF POINTS: VARIABLE HIGH: mg/L
FLUORIDATED? VARIABLE LOW: mg/L

Equipment

TYPE OF EQUIPMENT:

Saturator Age: _____

Volumetric feeder Age: _____

Meter pump Age: _____

Day Age: _____ Anti siphon value Age:

Other

Age: _____

PROJECTED EQUIPMENT NEEDS

WITHIN THE NEXT

YEAR:

WITHIN THE NEXT 2-3

YEARS:

WITHIN THE NEXT 4-5

YEARS:

Areas of expanding services which are currently not fluoridated

Potential need for grant funding (if possible, itemize needs and amounts)Fluoride Testing

Do you plan to continue monthly fluoride split sample Yes No

If yes, will you continue DCLS Yes No

Appendix E

Summary Reports

Annual Summary Report (2011)

Fluoridation Status as of December 31st 2011

			% of Fluoridated		% of Total	
	Systems	Populations	Systems	Populations	Systems	Populations
All Water Systems	1,192	6,368,562	--	--	100.00	100.00
Fluoridated						
Adjusted	143	3,852,809	23.79	63.27	12.00	60.50
Natural	238	148,769	39.60	2.44	19.97	2.34
Variable/Other	0	0	0.00	0.00	0.00	0.00
Defluoridated	2	595	0.33	0.01	0.17	0.01
Consecutive	218	2,087,162	36.27	34.28	18.29	32.77
Multi-source	0	0	0.00	0.00	0.00	0.00
Total	601	6,089,335	99.99	100.00	50.43	95.62
Non-Fluoridated						
Non-Adjusted	574	252,862	--	--	48.15	3.97
Variable/Other	3	14,586	--	--	0.25	0.23
Defluoridated	0	0	--	--	0.00	0.00
Consecutive	14	11,779	--	--	1.17	0.18
Multi-source	0	0	--	--	0.00	0.00
Total	591	279,227	--	--	49.57	4.38

	% of Fluoridated				% of Total	
	Systems	Populations	Systems	Populations	Systems	Populations
Non-optimally Fluoridated						
Non-Fluoridated						
Total	591	279,227	--	--	49.58	4.38
Fluoridated - not optimal						
Adjusted	8	157,849	1.33	2.59	0.67	2.48
Consecutive	207	2,028,433	34.44	33.31	17.37	31.85
Multi-source	0	0	0.00	0.00	0.00	0.00
Total	215	2,186,282	35.77	35.90	18.04	34.33
Optimally Fluoridated - Partial						
Adjusted	135	3,694,960	22.46	60.68	11.33	58.02
Consecutive	11	58,729	1.83	0.96	0.92	0.92
Multi-source	0	0	0.00	0.00	0.00	0.00
Total	146	3,753,689	24.29	61.64	12.25	58.94
Optimally Fluoridated						
Adjusted	0	0	0.00	0.00	0.00	0.00
Natural	0	0	0.00	0.00	0.00	0.00
Defluoridated	0	0	0.00	0.00	0.00	0.00
Consecutive	0	0	0.00	0.00	0.00	0.00
Multi-source	0	0	0.00	0.00	0.00	0.00
Total	0	0	0.00	0.00	0.00	0.00

