PROGRAM FOR
CROSS CONNECTION CONTROL
AND
BACKFLOW PREVENTION

TOWN OF SMITHFIELD
PUBLIC WORKS AND UTILITIES
DEPARTMENT

This program is established by the Town of Smithfield to protect the users of the Smithfield Water System. It is adopted pursuant to and in support of the Waterworks Regulations of the Commonwealth of Virginia. This program is effective September 7, 1993 (amended April 22, 2009, November 27, 2016, September 28, 2022).

I. Purpose

The purposes of this program are:

A. To prevent and protect the public potable water of the Town of Smithfield from the possibility of contamination or pollution by the installation and inspection of backflow prevention devices so as to prevent the possible backflow of such contaminants or pollutants into the public water system.
B. To promote the elimination or control of existing cross connections, actual or potential, between the consumer's in-plant potable water system(s) and non-potable water systems, plumbing fixtures and industrial piping systems.
C. To provide for the maintenance of a continuing Program of Cross Connection Control and Backflow Prevention which will systematically and effectively prevent the contamination or pollution of all potable water systems.

II. Personnel

The Compliance Administrator shall be responsible for the inspection of the waterworks for cross-connection and backflow prevention. This individual shall be familiar with the program and promote the program by the public information bulletins.

III. Definitions

A. Air Gap Separation: The unobstructed vertical distance through the free atmosphere between the lowest opening from any pipe or faucet supplying pure water to a tank, plumbing fixture, or other device and the flood-level rim of the receptacle.
B. Auxiliary Water System: Any water system on or available to the premises other than the waterworks. These auxiliary waters may include, but are not limited to, water from another purveyor's waterworks; water from a source such as wells, lakes, streams, or rivers; process fluids; or used water. They may be polluted, contaminated, objectionable, or constitute an unapproved water source or system over which the water purveyor does not have control.

C. Backflow: The flow of water or other liquids, mixtures, or substances into the distribution piping of the waterworks from any source or sources other than its intended source.
D. Backflow Prevention Device: Any approved device, method or type of construction intended to prevent backflow into a waterworks.
E. Consumer: The Owner or person in control of any premises supplied by or in any manner connected to a waterworks.
F. Consumer's Water System: Any water system located on the consumer's or other premises supplied by or in any manner connected to a waterworks.
G. Contamination: Any introduction into pure water of microorganisms, wastes, wastewater, undesirable chemicals or gasses.
H. Cross Connection: Any connection or structural arrangement, direct or indirect, to the waterworks whereby backflow can occur.
I. Degree of Hazard: The level of health hazard, as derived from an evaluation of the potential risk to health and the adverse effect upon the waterworks.
J. Double Gate-Double Check Valve Assembly: An approved assembly composed of two(2) single, independently acting check valves including tightly closing shutoff valves located at each end of the assembly and fittings for testing the water tightness of each check valve.
K. Existing Ground Level: The level above which surface water will not accumulate under normal conditions.
L. Flood Level Rim: The edge of the receptacle over which water could overflow.
M. Health Hazard: Any condition, device or practice in a water works or its operation that create or may create a danger to the health and well-being of the water consumer.
N. Low Inlet: Inlet with less than the minimum air gap between the inlet and the flood level rim.
O. Interchangeable Connection: An arrangement or device that will allow alternate but not simultaneous use of two (2) sources of water.
P. Nonpotable Water: Water not classified as pure water.
Q. Nontoxic Substance: Substance not of, or caused by, a toxin.
R. Owner: The person having legal title to the property or the person in charge, care and control of the property where the facilities in question are located; also, the tenants of said property.
S. Pollution: The presence of any foreign substance (chemical, physical, radiological or biological) in water that tends to degrade its quality so as to constitute an unnecessary risk or impair the usefulness of the water.
T. Pollution Hazard: A condition through which an aesthetically objectionable or degrading material may enter the waterworks or a consumer's water system.
U. Process Fluids: Any fluid or solution which may be chemically, biologically, or otherwise contaminated or polluted which would

constitute a health, pollution or system hazard if introduced into the waterworks. This includes, but is not limited to:

1. Polluted or contaminated waters.
2. Process waters.
3. Used water originating from the waterworks which may have deteriorated in sanitary quality.
4. Cooling waters.
5. Contaminated natural waters taken from wells, lakes, streams, or irrigation systems.
6. Chemicals in solution or suspension.
7. Oils, gases, acids, alkalies, and other liquid or gaseous fluids used in industrial or other processes or for fire fighting purposes.

V. Pure Water or Potable Water: Water fit for human consumption and use which is sanitary and normally free of minerals, organic substances, and toxic agents in excess of reasonable amounts for domestic usage in the area served and normally adequate in supply for the minimum health requirement of the persons served.

W. Reduced – Pressure – Principle Backflow Prevention Device:
A device containing a minimum of two (2) independently acting check valves together with an automatically operated pressure differential relief valve located between the two (2) check valves and below the first check valve. During normal flow and at the cessation of normal flow, the pressure between these two (2) checks shall be less than the supply pressure. In the case of leakage of either check valve, the differential relief of valve, by discharging to the atmosphere, shall operate to maintain the pressure between the check valves at less than supply pressure. The unit must include tightly closing shutoff valves located at each end of the device, and each device shall be fitted with properly located test port. These devices must be of the approved type.

X. Service Connection: The point of delivery of water to a customer's building service line as follow:

1. If a meter is installed, the service connection in the downstream side of the meter;
2. If a meter is not installed, the service connection is the point of connection to the waterworks.

Y. Service Line: That portion of the water line from the consumer's side of the service connection to the first water outlet.

Z. System Hazard: A condition posing an actual, or threat of, damage to the physical properties of the waterworks or a consumer's water system.

AA. Toxic Substance: Substance of, or caused by, a toxin.

BB. Toxin: Any substance of solids or liquids harmful for human consumption.

CC. Used Water: Any water supplied by a water purveyor from waterworks to a consumer's water system after it has passed through the service connection.

DD. Vacuum Breaker-Nonpressure: A vacuum breaker designed so as not to be subjected to continuous static line pressure.

EE. Vacuum-Pressure: A vacuum breaker designed so as to operate under conditions of static line pressure. This device must have test ports properly located so it can be tested.

FF. Water Purveyor: An individual, group of individuals, partnership, firm, association, institution, corporation, municipal corporation, county or authority which supplies water to any person from or by means of any waterworks. In the context of this document, the Town of Smithfield, Virginia is the Water Purveyor.

GG. Waterworks: A system that serves piped water for drinking or domestic use to (1) the public, (2) at least 15 connections, or (3) an average of at least 25 individuals for at least 60 days out of the year. The term "Waterworks" shall include all structures, equipment and appurtenances used in the storage, collection, purification, treatment and distribution of pure water except the piping and fixtures inside the buildings where such water is delivered.

IV. Procedures

1. New Facilities: Certified plans for facilities served by the waterworks requiring approved backflow prevention devices shall be submitted in triplicate to the Director of Public Works and Utilities prior to construction. The Director of Public Works and Utilities shall review the plans and advise if the plans are approved or disapproved. If disapproved, the designer and the Director of Public Works and Utilities shall consult with the Office of Drinking Water, Department of Health for a determination of what will be approved. The revised design shall be resubmitted for additional reviews. Only after final approval by the Director of Public Works and Utilities will it be permissible to proceed with the final construction.
2. Existing Facilities: Existing facilities shall be inspected for compliance with cross connection and backflow prevention program requirements and any deficiencies shall be immediately brought into compliance. The priority for scheduling inspections will be based on the known degree of hazard associated with the consumer being served. Those services designated as high in degree of hazard requiring total containment will be surveyed first. Services designated low hazard will receive second and third priority respectively. Other services will be surveyed upon completion of the above priorities. For residences and small commercial businesses a questionnaire similar to Appendix 3. will be provided to each owner. Follow up inspections will be made where hazards or potential hazards are identified. Corrective action will be required for any cross connections identified during the surveys or inspections.

V. Requirements

1. General: Any backflow prevention device shall be installed at a location and in a manner approved by the Compliance Administrator. Backflow prevention devices shall be of the approved type as set forth in Section 2.31 of the Town of Smithfield Design Standards. Backflow devices must be approved by University of Southern California Hydraulic Institute or the American Society of Sanitary Engineers (ASSE).
2. Facilities Requiring Approved Backflow Prevention Devices: A backflow prevention assembly or backflow elimination method shall be installed at consumer water systems serving the following types of facilities, including:
   A. Hospitals, mortuaries, clinics, veterinary establishments, nursing homes, and medical buildings;
   B. Laboratories;
   C. Piers, docks, waterfront facilities;
   D. Sewage treatment plants, sewage pumping stations, or storm water pumping stations;
   E. Food and beverage processing plants;
   F. Chemical plants, dyeing plants and pharmaceutical plants;
   G. Metal plating industries;
   H. Petroleum or natural gas processing plants or storage plants;
   I. Radioactive materials processing plants or nuclear reactors;
   J. Car washes and laundries;
   K. Lawn sprinkler systems, irrigation systems, fire service systems;
   L. Buildings with commercial, industrial, or institutional occupants served through a master meter;
   M. Slaughter houses and poultry processing plants;
   N. Farms where the water is used for other than household purposes;
   O. Water loading facilities;
   P. Commercial greenhouses and nurseries;
   Q. Health clubs with swimming pools, therapeutic baths, hot tubs or saunas;
   R. Paper and paper products plants and printing plants;
   S. Pesticide or exterminating companies and their vehicles with storage or mixing tanks;
   T. Facilities that blend, store, package, transport, or treat chemicals, and their related vehicles;
   U. Schools or colleges with laboratory facilities;
   V. High-rise buildings (4 or more stories);
   W. Multiuse commercial, office, or warehouse facilities;

X. Others specified by the Water Purveyor and/or the Department of Health where reasonable cause can be shown for a potential backflow or cross connection hazard.

3. Determination of Degree of Hazard: 630.1 of the Virginia Waterworks Regulations shall be used as a guide to determine degree of hazard, example listings of types of connections, and possible hazards from unprotected connections. For your reference, a copy of the Virginia Waterworks Regulations is contained in the Appendix of this document.

4. Location: Backflow preventing devices shall be readily accessible, preferably in the same room with the fixture they serve. Backflow prevention devices shall not be installed in areas subjected to flooding, in pits, or in such a manner as to be able to be bypassed. In all cases, installation shall be in accordance with the manufacturer's recommendations.

5. Requirements By Type of Device Used:

   A. Nonpressure Vacuum Breakers: Shall be used with the bottom of at least six (6) inches above flood level rim of the fixture they serve and on the discharge side of the last control valve. A nonpressure vacuum breaker shall not be installed where it will be under continuous operating pressure for more than twelve (12) hours in any twenty-four (24) hour period. Nonpressure vacuum breakers shall be installed line size.
   B. Pressure Vacuum Breakers: Shall be installed with the bottom at least twelve (12) inches above the flood level rim of the fixture they serve. Pressure vacuum breakers shall be installed line size.
   C. Reduced-Pressure-Principle Backflow Prevention Devices: Shall be installed a minimum of twelve (12) inches above existing ground level and, where possible, in an easily accessible location with adequate space to facilitate maintenance and testing. The devices must be protected from freezing. All drain pipes from the relief valve port must be provided with the proper air gap.
   D. Double Gate – Double Check Valve Assemblies: Which have been approved, may be installed as protective devices against backflow in connections between potable water system and other fluids which, in the judgment of the Director of Public Works, present no significant health hazard. Double gate – double check valve assemblies shall be installed in accordance with the installation

requirements for the reduced pressure principle backflow prevention devices (above).

VI. Inspections and Testing

1. General - All new connections or reconnections to the system shall be surveyed for potential cross connections prior to service. Testing procedures shall be in accordance with the manufacturer's instructions and approved by the Director of Public Works and Utilities or their authorized agent. Starting January 1, 2023, persons testing and repairing backflow prevention assemblies and backflow prevention devices shall be certified by a Commonwealth of Virginia tradesman certification program (identified by DPOR as backflow prevention device workers).

2. Frequency –

    A. Inspections and operational tests shall be made annually of backflow prevention devices which are repaired and installed. Where storage facilities are provided, at least one sample per month must be tested to verify that the water remains of satisfactory bacteriological quality. Devices shall be repaired, overhauled, or replaced as required by the Town. Overhaul interval shall not exceed five years.
    B. Commercial and industrial services shall be required to inspect internal piping annually.

3. Responsibilities and Reporting – Backflow prevention shall be inspected, tested, repaired, overhauled or replaced as necessary at the expense of the owner. Records of such inspections shall be forwarded to the Compliance Administrator on a form provided by the Compliance Administrator. See Appendix.

APPENDIX

The following attached lists, forms and references are to be used in the Town of Smithfield's Cross Connection Control and Backflow Prevention Program:

1. Letter to Homeowner Concerning Annual Backflow Testing
2. Backflow Device Report
3. Letter to Resident/ Business Owner Concerning Cross Connection
4. Homeowner Cross Connection Survey
5. Business Cross Connection Survey
6. Cross Connection Inspection Form
7. Part II, Sections 12VAC5-590-580 through 12VAC5-590-630 "Cross Connection Control and Backflow Prevention in Waterworks" of the Virginia Waterworks Regulations.

Reviewed and/or updated:

Chelsey Daughtrey — 9-28-2022

Compliance Administrator — Date

— 9/28/22

Director of Public Works and Utilities — Date

TOWN OF SMITHFIELD

"The Ham Capital of the World"

Home Owner/ Business Owner,

This letter serves as your friendly annual reminder to test your backflow prevention assembly! Once you have received a report following your test, you may mail the report to the emboldened address below, or send it via email to cdaughtrey@smithfieldva.gov.

Town of Smithfield
ATTN: Compliance Administrator
PO Box 246
Smithfield, VA 23431

Please have your device(s) tested and the report sent to the Town of Smithfield no later than ....(INSERT EXPECTED COMPLIANCE DATE) ...Failure to comply with this letter will result in follow up action(s) by the Town of Smithfield.

Backflow prevention devices must be tested on an annual basis in order to continue to operate efficiently. You must contact a **state certified backflow tester** to perform this test. On the back of this letter is a small list of local certified backflow testers. Always retain copies of your backflow device test reports for your records.

If your backflow prevention device is no longer in use due to the installation of an irrigation well, please send us a letter (affixed with your handwritten signature) indicating such, and containing your email address and telephone number.

If your backflow prevention device is no longer in use due to being "capped off", please send us a letter (affixed with your handwritten signature) indicating such, and containing your email address, telephone number, a photograph of your "capped off" backflow prevention assembly, and a copy of the invoice generated by the contractor for "capping off" your backflow prevention assembly.

This annual reminder is in accordance with the Town of Smithfield's Cross Connection & Backflow Prevention Program- more information on which may be viewed on the Town's website (www.smithfieldva.gov). From the home page, click the "Planning, Engineering & Public Works" section under the "Departments" tab near the top of the page. Then, select "Cross Connection & Backflow Prevention Program" on the right side of the page.

Feel free to contact me if you have any questions.

Sincerely,

Chelsey Daughtrey

Chelsey Daughtrey
Compliance Administrator
cdaughtrey@smithfieldva.gov

Local Backflow Testers

Smithfield Lawn and Garden
(757) 357-0659

Windsor Fire Ext. and Backflow
(757) 642-3224

Smithfield Plumbing and Heating
(757) 745-7745

Lanthorn Plumbing
(757) 729-4775

Be sure your tester is **certified, and ask to see credentials **before** any work is done!**

DEPT. OF PLANNING, ENGINEERING, AND PUBLIC WORKS
310 Institute Street, PO Box 246 / Smithfield, VA 23431 / (757)365-4200 / Fax (757)357-9933
Local Cable Channel 189
www.smithfieldva.gov

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Local Roots, Global Reach

ISLE OF WIGHT COUNTY, VIRGINIA

Backflow Prevention Assembly Test Report

Name of Premises/Owner _____

Location Address _____

Use and Location of Assembly _____

Assembly: _____ _____ _____ _____

Manufacturer *Model* *Size* *Serial #*

Line pressure at time of test: _____**psi** **Circle One:** EXISTING / REPLACEMENT / NEW DEVICE

Reduced Pressure Zone Assembly	***Requirements***	***Initial Test***	***Repairs***	***Retest***
Check Valve # 1 Pressure drop across Check Valve #1	Closed tight? Min. of 5.0 psid	☐Yes ☐No (A)_____psid		☐Yes ☐No (A) _____psid
Check Valve #2	Closed tight?	☐Yes ☐No		☐Yes ☐No
Differential Pressure Relief Port	Must open at Min. of 2.0 psid	Opened at (B) _____psid		Opened at (B) _____psid
Pressure Buffer	A – B = or > 3.0 psid	_____psid		_____psid
Double Check Valve Assembly	***Requirements***	***Initial Test***	***Repairs***	***Retest***
Check Valve # 1	Closed tight? Min. of 1.0 psid	☐Yes ☐No _____psid		☐Yes ☐No _____psid
Check Valve #2	Closed tight? Min. of 1.0 psid	☐Yes ☐No _____psid		☐Yes ☐No _____psid
Pressure/Spill-resistant Vacuum Breaker	***Requirements***	***Initial Test***	***Repairs***	***Retest***
Air Inlet	Opened? Min. of 1.0 psid	☐Yes ☐No _____psid		☐Yes ☐No _____psid
Check Valve	Closed tight? Min. of 1.0 psid	☐Yes ☐No _____psid		☐Yes ☐No _____psid

Remarks: _____

Certification: *"I have completed the above test and hereby certify that this Backflow Prevention Assembly performs satisfactorily and meets all Federal, State and local codes and regulations as required."*

Tester Name _____ Signature _____ Date _____

License # _____ Expiration Date _____ Licensed/Certified by _____

Test Kit Model & Serial# _____ Calibration Date _____

Testing Company _____ Phone # _____

Company Address _____

Re-Tester Name _____ Signature _____ Date _____

License # _____ Expiration Date _____ Licensed/Certified by _____

Test Kit Model & Serial# _____ Calibration Date _____

Please mail the original test form to the waterworks that serves the premises:

Town of Smithfield
P.O. Box 246
Smithfield, VA 23431
Attn: Backflow Administrator
cdaughtrey@smithfieldva.gov

Isle of Wight County
P.O. Box 108
Isle of Wight, VA 23397
Attn: Philip Jones
Backflow-FOG-Compliance@iwus.net

Town of Windsor
P.O. Box 307
Windsor, VA 23487
Attn: Kenneth Sims
ksims@windsor-va.gov

TOWN OF SMITHFIELD

"The Ham Capital of the World"

DATE

ADDRESS

Dear Resident/ Business Owner,

The Commonwealth of Virginia Waterworks Regulations requires all water purveyors' to establish and enforce a program of cross connection and backflow program. You may remember reading about this program in the last Town of Smithfield newsletter. This requirement was established to prevent contamination of the public water supply. Contamination may occur under back siphonage and back pressure conditions whereby contaminants are siphoned or forced back into the public water system.

Part of the program requires each resident and business to complete the attached Cross Connection Survey. This survey will help us identify any areas on your premises where contamination to the public water supply could occur and where backflow prevention devices may need to be installed.

The town wants to ensure that the public health and safety of all our citizens, therefore we ***must*** have this survey mailed back to us within 30 days of receipt. We have enclosed a postage paid return envelope for your convenience. If you have any questions about the survey, please contact me at (757) 365-4200 or cdaughtrey@smithfieldva.gov.

We appreciate your cooperation with this important public safety mandate.

Sincerely,

Chelsey Daughtrey

Chelsey Daughtrey
Compliance Administrator
Public Works and Utilities

TOWN OF SMITHFIELD

Cross-Connection Survey

Name _____

Address _____

Phone # _____

1. Is your business connected to the public water system? ___Yes ___No
2. Do you have your own well? ___Yes ___No
3. If your business is connected to the public water system and you do have your own well, are both available for you to use in your business? ___Yes ___No

4. How do you heat your business?
   a. Heat Pump ___Yes ___No
   b. Electric baseboard ___Yes ___No
   c. Oil fueled furnace ___Yes ___No
   d. Other ___Yes ___No
5. Do you have an irrigation system? ___Yes ___No
6. Do you have a darkroom set up for developing photographic pictures? ___Yes ___No
7. Do you use your water in your business for other uses Other than normal business functions? ___Yes ___No

If yes, please explain:_____

_____

_____

_____

_____ _____

Signature Date

If you have any questions or concerns about this survey, please contact Chelsey Daughtrey at 365-4200 or cdaughtrey@smithfieldva.gov

TOWN OF SMITHFIELD

Cross-Connection Survey

Name _____

Address _____

Phone # _____

	Yes	No
1. Is your house connected to the public water system?		
2. Do you have a backflow device installed?		
3. Do you have your own well?		
4. If your house is connected to the public water system and you do have your own well, are both available for you to use in your house?		
5. How do you heat your home?		
A: heat pump		
B: electric baseboard		
C: oil fueled furnace		
D: other		
6. Does your outside hose connections have vacuum breakers (attachment commonly placed on hose bibs that prevents water from being siphoned backward into the public drinking water system) ?		
7. Do you have a swimming pool?		
8. Do you use your well for irrigation?		
9. Do you have a darkroom set up for developing photographic pictures?		
10. Do you use your water in your house for other uses other than normal house hold functions?		

If yes, please explain: _____

_____

_____

_____ Signature

_____ Date

Thank you for your cooperation with this survey. If you have any questions about this survey, please contact at (757) 365-4200 and ask for the Backflow Adminstrator.

Town of Smithfield

Cross-connection Inspection

Name _____ Telephone # _____

Address _____

Date of initial survey _____ Follow up inspection _____

Protection Required On The Following:

Air compressors		Laundry Machines	
Aspirator, Medical/Funeral		Lavatory	
Autopsy Tables		Lawn Sprinkler	
Babtismal Fountian		Photo Lab sinks	
Bedpan Washer		Pipette washer	
Boat docks		Pump Pneumatic Eject	
Boiler feed lines		Pump Prime Lines	
Bottle washer		Recirculated Water	
Car wash		Sewer, flushing manhole	
Chemical feeder tanks		Sewer, Sanitary/Storm	
Chlorinator		Sewer/ Pump stations	
Detergent Dispencers		Shampoo Basin- Beauty Shop	
Dishwashers		Utility Sinks	
Drinking Fountian		Solution Tanks	
Etching Tanks		Sprinkler /Fire Protection	
Floor drain flushing		Steam Cleaner	
Fountian/ Ornamental		Steam Table	
Garbage can washer		Swimming Pool	
Hose Faucets		Ultrasonic Baths	
Humidifer Tanks		Urinal/ Trough	
Ice Makers		Water Closets	
Lab Equipment		Water Tanks	
Secondary Well Systems		Water Treatment Tanks	

Water Source: _____

Remarks: _____

** Please contact the Compliance Administrator at 365-4200 if you have any questions about this inspection.

Building Representative: _____ Inspector _____

B. The owner shall report the following incidents within 24 hours to the department:

1. Water pressure below the 20 psi minimum required in the distribution system, including zero or negative pressure. Examples of these events include treatment plant or pump station shutdowns due to equipment failure, power outages, emptying of storage tanks, and draining of the distribution system during fire flow events.

2. Flooding of clearwells.

3. Flooding of groundwater wells.

4. Any other situation that occurs with the waterworks that presents or may present an imminent and substantial threat to public health.

12VAC5-590-580. General requirements for cross-connection control and backflow prevention.

A. Every owner shall establish and enforce a cross-connection control program (CCCP) in accordance with 12VAC5-590-360. The goal of the CCCP is to prevent the intrusion of contamination into the distribution system via cross-connections and backflow. The owner shall document the CCCP activities in a cross-connection control plan and submit the written document to the department for review and approval.

B. No owner shall install, maintain, or allow a service connection to any premises where cross-connections to a waterworks or a consumer's water system exist, unless the owner and department ensure the cross-connections are adequately safeguarded.

C. No owner shall install, maintain, or allow any connection whereby water from an auxiliary water system may enter a waterworks or consumer's water system, unless the owner and department approve the auxiliary water system, the method of connection, and use of such system].

D. The owner, in accordance with 12VAC5-590-510 C, shall maintain acceptable working pressures in the distribution system to reduce the potential for backflow to occur.

12VAC5-590-600. Cross-connection control program responsibilities.

A. The owner shall establish and implement a CCCP consistent with the extent of the distribution system and the consumers served by the waterworks. The owner shall review the CCCP and written cross-connection control plan not less than every five years and update it as necessary to satisfy the requirements of this chapter. The owner shall submit updates to the department to obtain approval. The department may review the plan upon request. This program shall include at least one designated individual assigned by the owner. Requirements for this position shall include training and experience in cross-connection control programs.

B. The CCCP shall not be in conflict with the USBC and applicable building code regulations, including 13VAC5-63 or subsequent regulations promulgated by the Board of Housing and Community Development.

C. The CCCP shall ensure complete assessments of every consumer's water system and shall determine both the degree of hazard and the appropriateness of existing safeguards to prevent contamination from cross-connections and backflow.

D. The CCCP shall ensure testing, maintenance, and repairs of all backflow prevention assemblies, backflow elimination methods, and backflow prevention devices required and installed pursuant to 12VAC5-590-610.

E. 13VAC5-63-530, which incorporates the International Property Maintenance Code into the USBC, requires testing of RPZ assemblies, double check valve assemblies, double check detector backflow assemblies, and pressure vacuum breaker assemblies after initial installation, immediately after repairs or relocation, and annually thereafter. The CCCP shall establish procedures for completing and monitoring operational tests, or other evaluation procedures as appropriate, at least annually, and after installation, relocation, or repairs, for testable backflow prevention assemblies, devices, and methods that provide containment. The CCCP may include a public education program to:

1. Prompt consumer self-assessments, increase the awareness of cross-connections, and inform the consumer of the public health hazards of backflow.

2. The public education program, if provided as part of the CCCP, shall include, at a minimum, the following:

a. Causes of backflow;

b. Hazards and health effects of cross-connections and backflow;

c. Resources available to identify actual or potential cross-connections;

d. Safeguards to use to eliminate or control the hazards at the point of use; and

e. Sources for additional information.

F. The CCCP shall provide a method to discontinue or refuse water service to the consumer to ensure that the waterworks is adequately protected from cross-connections and backflow if any of the following conditions occur:

1. The consumer does not install, test and maintain a required backflow prevention assembly or backflow elimination method in accordance with the applicable sections of this chapter;

2. The consumer allows a required backflow prevention assembly or backflow elimination method to become inoperable or the consumer removes or bypasses it; or

3. The owner knows an unprotected or inadequately protected cross-connection exists on the premises and determines that there is inadequate backflow prevention at the service connection.

G. In the event of backflow of contaminants into the waterworks, the owner shall promptly take or cause corrective action to confine and eliminate the contamination. The owner shall report the event to the department within one business day in the most expeditious manner. The owner shall submit a written report by the 10th day of the month following the month during which backflow occurred addressing the incident, its causes and effects, and safeguards required or other action taken.

H. The owner shall maintain an inventory and records of testing, repairs, and maintenance of all backflow prevention assemblies, backflow elimination methods, and backflow prevention devices required and installed under 12VAC5-590-610 C. In the case of single-family residences subject to 12VAC5-590-610 C 5, the owner may determine whether or not to maintain an inventory or records. The department recommends the owner follow best practices identified in the AWWA Manual of Water Supply Practices M14 and the EPA Cross-Connection Control Manual.

I. The owner shall maintain an inventory and records of testing, repairs, and maintenance of all backflow prevention assemblies, backflow elimination methods, and backflow prevention devices required and installed under 12VAC5-590-610 E.

J. The owner shall maintain records related to the CCCP implementation, and any other records the department requires in accordance with 12VAC5-590-550.

12VAC5-590-610. Containment of backflow.

A. The owner shall ensure installation of backflow prevention assemblies or backflow elimination methods (i) at the service connection or (ii) downstream of the service connection but before any unprotected takeoffs.

B. Where the consumer's water system is not intricate or complex and where actual or potential cross-connection hazards can be eliminated or controlled, instead of containment, the owner may allow consumers to use point-of-use isolation protection by application of appropriate backflow prevention assemblies, backflow prevention devices, or backflow elimination methods complying with the USBC.

C. A backflow prevention assembly or backflow elimination method shall be installed where the following conditions exist:

1. A substance is handled in such a manner as to create an actual or potential hazard to a waterworks (this shall include premises having sources or systems containing process fluids or waters originating from a waterworks which are no longer under the control of the owner);

2. There exists internal cross-connections that, in the judgment of the owner or the department, may not be easily correctable or have intricate or complex plumbing arrangements that make it impracticable to determine whether or not cross-connections exist;

3. There are security requirements or other prohibitions or restrictions that prevent the assessment of all potential cross-connections that may impair the quality of the water delivered;

4. There is a repeated history of cross-connections being established or reestablished;

5. There are fire protection systems, lawn sprinkler systems, or irrigation systems;

6. The owner or department can show that a potential cross-connection hazard exists.

D. The owner shall ensure that consumers equip premises having booster pumps or fire pumps connected to the waterworks with control devices to prevent a reduction of pump suction line pressure to less than 20 psig.

E. A backflow prevention assembly or backflow elimination method shall be installed at consumer water systems serving the following types of facilities, including:

1. Hospitals, mortuaries, clinics, veterinary establishments, nursing homes, and medical buildings;

2. Laboratories;

3. Piers, docks, and waterfront facilities;

4. Sewage treatment plants, sewage pumping stations, or storm water pumping stations;

5. Food and beverage processing plants;

6. Chemical plants, dyeing plants, and pharmaceutical plants;

7. Metal plating industries;

8. Petroleum or natural-gas processing or storage plants;

9. Radioactive materials processing plants or nuclear reactors;

10. Car washes and laundries;

11. Buildings with commercial, industrial, or institutional occupants served through a master meter;

12. Water loading facilities;

13. Slaughter houses and poultry processing plants;

14. Farms where the water is used for other than household purposes;

15. Commercial greenhouses and nurseries;

16. Health clubs with swimming pools, therapeutic baths, hot tubs, or saunas;

17. Paper and paper-product plants and printing plants;

18. Pesticide or exterminating companies and their vehicles with storage or mixing tanks;

19. Facilities that blend, store, package, transport, or treat chemicals, and their related vehicles;

20. Schools or colleges with laboratory facilities;

21. Highrise buildings (four or more stories);

22. Multiuse commercial, office or warehouse facilities; and

23. Others specified by the owner or the department when reasonable cause can be shown for a potential backflow or cross-connection hazard.

F. All temporary or emergency service connections shall be protected where reasonable cause can be shown for a potential backflow or cross-connection hazard. Backflow prevention assemblies or backflow

elimination methods used shall be appropriately certified or approved to match the requirements of this section.

12VAC5-590-630. Backflow prevention assemblies, devices, and backflow elimination methods for containment.

A. Any backflow prevention assembly or backflow elimination method or backflow prevention device shall be of the approved type and shall comply with the USBC.

B. General safeguards

1. The backflow prevention assembly or backflow elimination method or backflow elimination device used shall depend on the degree of hazard that exists or may exist. The safeguard shall ensure maintenance of the distribution system water quality and its usefulness.

2. The degree of hazard, either high or low, is based on (i) the nature of the contaminant; (ii) the potential of the health hazard; (iii) the potential method of backflow (either by backpressure or by backsiphonage); and (iv) the potential effect on waterworks structures, equipment, and appurtenances used in the storage, collection, purification, treatment, and distribution of potable water. Table 630.1 shall be used as a guide to determine the degree of hazard for any situation.

Table 630.1
Determination of Degree of Hazard

Cross-connections that meet or may meet the following conditions shall be rated at the corresponding degree of hazard.	
High Hazard	Low Hazard
The contaminant would be toxic, poisonous, noxious, unhealthy, or of unknown quality.	The contaminant would only degrade the quality of the water aesthetically or impair the usefulness of the water.
A health hazard would exist.	A health hazard would not exist.
The contaminant would disrupt the service of piped water for human consumption.	The contaminant would not disrupt service of piped water for human consumption.
Backflow would be by either backpressure or backsiphonage.	Backflow would occur by backsiphonage.
Examples: lawn irrigation systems, fire sprinkler systems with chemical additives or antifreeze, sewage, used water, nonpotable water, auxiliary water systems, and mixtures of water and other liquids, gases, or other chemicals.	Examples: food residuals, coffee machines, non-carbonated beverage dispensers, and residential fire sprinkler systems constructed of materials designed for potable water flow.

3. The USBC and the manufacturer's specifications shall be used to determine the appropriateness of the backflow prevention assembly or backflow prevention device application for containment.

C. Owners shall not allow the installation of backflow prevention devices or backflow prevention assemblies with openings, outlets, or vents that are designed to operate or open during backflow prevention:

1. In areas subject to flooding or in pits;

2. In areas with atmospheric conditions that represent a contamination threat to the potable water supply; and

3. In such a manner as to be able to be bypassed.

D. Starting January 1, 2023, persons testing and repairing backflow prevention assemblies and backflow prevention devices shall be certified by a Commonwealth of Virginia tradesman certification program (identified by DPOR as backflow prevention device workers). Until January 1, 2023, persons testing and repairing backflow prevention assemblies and backflow prevention devices shall be qualified to perform such work as demonstrated by possessing a certification or license from a local or state agency

having legal authority or shall possess a certificate of completion of applicable vocational training acceptable to the owner.

Part III - Manual of Practice for Waterworks Design

12VAC5-590-640. General design considerations.

A. Waterworks shall conform to the Public Water Supply Law, Article 2 of Chapter 6 of Title 32.1 of the Code of Virginia. Community waterworks shall be designed to provide for the estimated water demand for 10 to 30 years hence under predicted growth conditions. All waterworks shall be designed so that they can readily be increased in capacity except where circumstances preclude the probability of expansion. Expansion by modular steps should be considered.

B. Waterworks design shall be based on sound engineering practice substantiated in the engineer's design and approved by the department. Historical data or typical usage figures of waterworks with similar service area characteristics and appropriate peaking factors shall be used to support the design. USBC and design standards may be referenced for noncommunity waterworks, as appropriate.

1. Community waterworks shall be designed to meet or exceed the estimated maximum daily water demand of the service area at the design year. The design shall account for diurnal demand patterns and special demands placed on the waterworks such as firefighting, industrial use, and wholesale customers.

2. Noncommunity waterworks shall be designed to meet or exceed the peak hour demand of the proposed services. Either pump capacity or storage capacity or both may be utilized to meet the peak hour demand.

3. Effective storage.

a. Community waterworks shall provide sufficient finished water effective storage to enable the waterworks to meet the estimated maximum daily water demand at the design year. Compliance with this requirement is normally determined by the use of a hydraulic model. In the absence of a hydraulic model, effective storage shall be a minimum of one-half of estimated maximum daily water demand of the waterworks at the design year.

b. There is no minimum finished water effective storage requirement for noncommunity waterworks.

c. Effective storage of atmospheric storage tanks shall be the volume available to store finished water in atmospheric reservoirs or tanks, measured as the difference between the overflow elevation, or the normal maximum operating level, and the minimum storage elevation. For atmospheric tanks that use a portion of their volume to generate distribution system pressure, the minimum storage elevation is that elevation of water in the tank that can provide a minimum pressure of 20 psig throughout that tank's service area under distribution system-wide maximum daily water demand.

d. Effective storage of pressure storage tanks shall be one-third of the nominal pressure vessel storage capacity.

C. Waterworks shall be designed to provide a minimum residual pressure of 20 psig at all service connections. Design shall be based on the most restrictive conditions, defaulting to the greater of peak hour demand or maximum daily water demand plus applicable fire flows. Fire flow design values shall be identified by the engineer after coordination among the owner, local and state building officials, and fire officials. Distribution system hydraulic modeling may be used to demonstrate compliance with this requirement.

D. Materials used in the construction of waterworks that are in contact with the product water shall comply with NSF/ANSI/CAN Standard 61-2020 or an approved equivalent.