WESTERN VIRGINIA
WATER AUTHORITY

Cross Connection Control and Backflow Prevention Program

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OFFICE OF DRINKING WATER
LEXINGTON FIELD OFFICE

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Department of Health
Office of Drinking Water
Lexington Field Office

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Date

Engineering Field Director

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I. Introduction & Purpose

The Western Virginia Water Authority (Authority) and its customers share the responsibility to help safeguard the public water supply from the possibility of contamination. We work closely with the Virginia Department of Health and our customers to prevent cross connections, and potential backflow issues so your drinking water maintains the highest possible quality.

The Authority developed the Cross Connection Control and Backflow Prevention Program in compliance with the Commonwealth of Virginia Waterworks Regulations. The Cross Connection Control Program Administrator shall administer and enforce this program under the supervision of the Authority's Chief Operating Officer of Water Quality. The program shall apply to all public water systems under operation by the Authority.

What is Backflow?
A plumbing cross-connection is an actual or potential connection between the public water supply and any source of contamination or pollutant. Through this connection contaminated substances or non-potable water could **backflow** into the public system and your drinking water supply without proper plumbing precautions.

Water traveling through the Authority's distribution system is pressurized. If the water system loses pressure, such as during a water main break, maintenance of the system or flowing of a fire hydrant, the flow of the water may be reversed. If a customer has a cross-connection with hazardous substances or even non potable water, these substances can backflow into the public water system and create a risk to public health.

Where Can Contamination Occur?
- In tubs, sinks and buckets... Hoses left submerged in swimming pools, kitchen or laundry sinks, bath tubs, animal watering troughs or buckets can pull untreated water into your drinking water.
- Through your garden hose... If your outside faucet is not protected by a hose-bib vacuum breaker, chemical sprayers attached to a hose can backflow through your hose into your home's plumbing system.
- Through your faucet... A faucet submerged into another liquid can be a cross-connection whereby the substance could backflow into your plumbing.

How Can You Prevent Backflow from Occurring?
An approved hose-bib vacuum breaker should be attached to all outside spigots. This device, available at home-improvement and hardware stores, prevents water from back flowing if water pressure drops. When using a hose or faucet, always leave at least a two inch (2") gap between the end of any water hose/faucet and the source of any potential contamination.

- Help **identify potential locations** in our service area where backflow can occur by taking the backflow prevention survey through the link on the Authority's website (westernvawater.org).
- If necessary, contact the Water Authority to **schedule a free assessment** with our staff to assist you in identifying and removing any potential cross-connection sources.
- **Remove any cross-connections** you find or install approved backflow prevention devices where needed. A Water Authority Cross Connection Inspector is available to assist you with this process if needed.
- **If you have a backflow prevention device installed by a certified plumber, have it tested annually**, and after any repairs.

Need help?... Whether you found a cross-connection in your home or you aren't even sure where to start looking, we can help. We have technicians who are available to help you identify where backflow can occur on your property. The service call is free!

If you have any questions concerning Cross-Connection Control and Backflow Prevention, please contact the Western Virginia Water Authority at 540-853-5700 or email us at ccinspection@westernvawater.org.

II. Regulations

In 1974 the Virginia Waterworks Regulations were adopted to conform with the Federal "Safe Drinking Water Act," PL 93-523 (as amended) and Federal Regulation 40 CFR Part 141. The latest revision to the waterworks Regulations was effective June 23, 2021. Cross connection and backflow prevention programs shall be in compliance with the Commonwealth of Virginia Waterworks Regulations.

Applicable excerpts from regulations are included below:

12VAC5-590-360 Responsibilities of the Owner

A. The Owner shall provide and maintain conditions throughout the entirety of the waterworks in a manner that will assure a high degree of capability and reliability to comply with Part II (12VAC5-590-340 et seq.) of this chapter. This requirement shall pertain to the source water, transmission, treatment, storage, and distribution system facilities and the operation thereof. The Owner shall identify and evaluate factors with the potential for impairing the quality of the water delivered to the consumers. Preventative control measures identified in Part II of this chapter shall be promptly implemented to protect public health.

B. For the purpose of achieving compliance with this chapter, the Owner shall exercise control of the waterworks from the source water to the service connection. This requirement does not imply Ownership of or maintenance for any portion of the service line where local agreements and conditions dictate otherwise.

C. The property Owner shall exercise control of all buildings, structures, and equipment up to the point of the service connection to the waterworks. This requirement does not limit or modify Ownership of or maintenance for the service line that may be specified by local agreements and conditions.

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 CCC*

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 Page 240 of 300 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 Virginia Uniform Statewide Building Code (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.

In accordance with the Virginia Waterworks Regulations and the Uniform Statewide Building Code the Authority has developed a Cross Connection Control and Backflow Prevention Program designed to ensure safe drinking water for every customer. This document outlines the Authority's program which is designed to educate and reinforce the importance of avoiding or eliminating cross connections and possible backflow into the public drinking water system.

To prevent backflow from entering the water distribution system, the Authority requires an appropriate backflow preventer be installed at each service connection where hazards or potential hazards are found. A backflow preventer is a mechanical assembly that prevents the backflow of pollutants or contaminants into the potable water distribution system. There are different requirements based on the type of service connection and hazards identified at the location. Specific guidelines for backflow preventers at each type of connection, as well as hazards, are outlined in the program to ensure that connections and the public water supply are properly protected.

III. Definitions

For the purposes of this program, the following terms shall have the following meanings:

1. Authority: The Western Virginia Water Authority and its personnel.

2. Air Gap: A physical separation between the free flowing discharge end of a potable water supply pipeline and an open or non-pressure receiving vessel. An “approved air-gap separation” shall be at least double the diameter of the supply pipe measured vertically above the top rim of the vessel, with a minimum of two-inch separation in all cases.

3. Backflow: The reversal of the normal flow of water or other fluids, mixtures or substances through the distributing pipes of the water system because of an increase in the downstream pressure to a rate that is higher than the supply pressure.

4. Backflow preventer: Equipment or measures that are designed to prevent backflow or back-siphonage, such as air gaps, reduced pressure principle devices, double check valve assemblies, pressure vacuum breakers and residential dual check valves.

5. Back-siphonage: The reversal of the normal flow of water or other liquids, mixtures or substances through the distributing pipes of the water system because of negative pressure from a vacuum or partial vacuum in the pipes that supply water.

6. Certified Tester: (Non-Authority Personnel) Effective 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). Cross-connection: Any physical connection between a potable water supply and waste pipe, soil pipe, sewer drain or unapproved source or system, including any potable water supply outlet which is submerged or can be submerged in wastewater or any source of contamination.

7. Degree of hazard: An evaluation of the potential risk to health and adverse effect on the water system.

8. Double Check Valve Assembly: An approved assembly consisting of two independently acting check valves, including tightly closing shut-off valves located at each end of the assembly and fitted with properly located test cocks. This assembly shall only be used to protect against a non-health hazard.

9. Locality Building Official: Designated inspector or technician assigned by locality performing plan review and plumbing inspection for new structures or modifications to existing structures that will be connected to the WVWA public water system.

10. Non-potable Water: Water that is not safe for human consumption or that is not potable.

11. Owner: The Owner, occupant or tenant of a building or structure.

12. Plumbing fixtures: Receptacles, devices or appliances that are installed to supply, receive or discharge water or wastewater.

13. Plumbing system: Water supply and distribution pipes, plumbing fixtures, traps, soil, waste and vent pipes, building drains, building sewers, water-treating and water-using equipment

and connection devices and appurtenances that supply water to a building and that are located on the property where the building is located.

14. Pollution: The presence of any foreign substance in water that tends to degrade its quality.

15. Potable Water: Water that is free from impurities in amounts that are sufficient to cause disease or harmful physiological effects and that contains bacteriological and chemical qualities, which conform to the requirements of the Department of Health's Virginia Waterworks Regulations and of the Authority.

16. Pressure Vacuum Breaker: An assembly containing an independently operating loaded check valve and an independently operating loaded air inlet valve located on the discharge side of the check valve. The assembly is to be equipped with properly located test cocks and tightly closing shut-off valves located at each end of the assembly. This assembly is designed to protect against a health hazard under back-siphonage condition only.

17. Reduced Pressure Zone Assembly: An approved assembly containing a minimum of two independently acting check valves together with a hydrostatically operated mechanically independent pressure differential relief valve located between the two check valves. During normal flow and at the cessation of normal flow, the pressure between these two checks shall be less than the supply pressure. The unit must include tightly closing shut-off valves located at each end of the device, and each device shall be fitted with properly located test cocks. These devices must be approved by the Authority in accordance with the Virginia Department of Health Waterworks Regulations, and local pluming code standards.

18. Technician: An employee of the Authority duly authorized to act on its behalf.

19. Thermal Expansion: All liquids and gases expand when heated. Thermal expansion is a physical property related to a water volume increase inside the pipe when water is heated.

20. USBC: The Virginia Uniform Statewide Building Code (USBC) contains the building regulations that must be complied with when constructing a new building, structure, or an addition to an existing building. They must also be used when maintaining or repairing an existing building or renovating or changing the use of a building or structure. The USBC is comprised of three parts: Virginia Construction Code, Virginia Existing Building Code and Virginia Maintenance Code.

IV. General Program Requirements

As a condition of service, every building and structure served by the Authority shall be constructed, equipped, and maintained to prevent the contamination or pollution of the potable water supply from cross-connection, and backflow or back-siphonage of contaminants.

1. Cross-connection prohibited

(a) The Authority's potable water supply system and any connections to it shall be designed, installed, and maintained to prevent non-potable liquids, solids or gases from being introduced into the potable water supply through cross-connections.

(b) No person shall permit a cross-connection between the Authority's potable water supply system and other systems or equipment. If there are multiple water sources to any one apparatus, the only acceptable protective measure for the connection to the Authority's potable water supply shall be an air gap.

2. Measures to prevent backflow or back-siphonage

The Owner shall install and maintain an approved backflow preventer on all fixtures, equipment, and outlets where backflow or back-siphonage may occur. The Owner shall install and maintain a backflow preventer on the water service line when the Authority determines that a backflow preventer is necessary to protect the water supply from backflow or back-siphonage.

3. Prevention devices to comply with rules and regulations

All cross-connection or backflow prevention devices or systems shall be designed, installed and maintained in accordance with the AWWA Cross-Connection Control Program, and the Virginia Uniform Statewide Building Code. Backflow prevention devices shall be installed in a manner approved by the Authority and in accordance with the manufacturer's installation instructions.

4. Responsibility of the Authority and Owner

(a) The Authority and/or the Locality Building Official shall inspect the plumbing system of every building or structure so as to determine that the plumbing system has been properly installed to prevent the possibility that the Authority's water supply become polluted by cross-connection, backflow or back-siphonage.

(b) The Authority shall have the right to enter any building or structure during reasonable hours for the inspection of the plumbing system for cross-connection, backflow or back-siphonage. The Owner shall furnish the Authority, with all information requested regarding the plumbing system for the property.

(c) The Owner shall be responsible for the installation, maintenance, and testing of all required backflow preventers.

(d) The Owner shall have all required backflow preventers tested annually by a Certified Tester. In the City of Roanoke and Roanoke County annual inspection test reports shall be submitted to the localities building official. In Franklin and Botetourt Counties

annual inspection reports shall be submitted directly to the Western Virginia Water Authority.

(e) The Owner shall be responsible for all work required to eliminate a cross connection or any deficiencies in backflow prevention that are identified during inspection.

V. New Construction including Renovations & Additions

1. Application and Site Plan Review Process

The Owner shall contact the Authority's Engineering Division by phone, web site or in person to complete an **Availability Application** for a new water connection or to request an additional or larger service connection. At that time the Owner will be informed of any fees and additional information required to evaluate the request. All new service connections are to be constructed in accordance the Western Virginia Regional Design and Construction Standards as well as the Uniform Statewide Building Code adopted by the Governing Locality.

Upon request the Owner will be required to submit design plans for the new connection that include the following:

(a) Fixture Counts
(b) Plumbing plans for the entire project
(c) Information regarding planned water uses for the new connection, including sprinkler systems
(d) The proposed location of each backflow prevention device
(e) Any preexisting private or auxiliary water

The Authority shall review the plans for new or altered water connections and evaluate the degree of hazard resulting from proposed use and design of the water system. If the plans do not provide adequate backflow protection, the Authority shall inform the Owner in writing regarding any changes to the design or specifications required. If necessary, revised plans or additional information may be requested.

2. Installation of Approved Assembly

Non-Residential Connections

All new non-residential construction shall have, at a minimum, an approved check valve assembly on each service line regardless of the degree of hazard. (For information regarding irrigation and fire sprinkler systems refer to the appropriate section of this document outlining specific requirements.)

Backflow prevention devices shall be installed in a manner approved by the Authority, must be located between the meter and the first point of use by the customer, and shall be in accordance with the Authority's Design and Construction Standards and the Uniform Statewide Building Code.

Where a backflow prevention assembly is required, such assemblies shall meet the following standards:

Performance Requirements for Double Check Backflow Prevention Assemblies and Double Check Fire Protection Backflow Prevention Assemblies	ASSE 1015 USC Approved
Performance Requirements for Double Check Detector Fire Protection Backflow Prevention Assemblies	ASSE 1048 USC Approved
Performance Requirements for Reduced Pressure Principle Backflow Preventers and Reduced Pressure Principle Fire Protection Backflow Preventers	ASSE 1013 USC Approved
Performance Requirements for Reduced Pressure Detector Fire Protection Backflow Prevention Assemblies	ASSE 1047 USC Approved

Residential Connections

New residential construction requires a dual-check-valve type backflow preventer on the connection. This device must be installed in compliance with the current Western Virginia Regional Design and Construction Standards and the USBC.

Performance Requirements for Dual Check Backflow Preventers	ASSE 1024 USC Approved

This is a non-testable device, so the testing requirements outlined in this program do not apply to this particular device.

NOTE: If a residential irrigation system exists, a Reduced Pressure Principle Assembly is required (see Irrigation system section for necessary requirements).

Domestic plumbing with backflow protection must be designed to accommodate thermal expansion. Boilers and water heaters are a common source of backpressure backflow caused by thermal expansion. To prevent backflow, a closed piping system must have a means to safely accommodate or relieve the effects of excessive pressure caused from thermal expansion. Pressure relief devices required for thermal expansion shall be in accordance with the Code of Virginia, and the most current Uniform Statewide Building Code adopted by the Governing Jurisdiction. The Owner should take steps to mitigate thermal expansion to prevent damage to the homes plumbing. Contact the local building official or a licensed plumber for more information.

Hose bib vacuum breakers shall be installed on all threaded hose bibs that do not have an ASSE 1019 anti-siphon approved wall faucet. This device must meet ASSE Standards.

Performance Requirements for Hose Connection Vacuum Breakers	ASSE 1011 USC Approved

3. Initial Test and Final Inspection

Once installed, initial testing and inspection of each backflow prevention device or assembly is required prior to final approval by the Authority. The Owner shall have the assembly tested by a Certified Tester and shall have obtained final approval from the local building official for proper installation.

The Authority's Cross Connection Inspector will then conduct a final visual inspection of the devices to assure that they meet the criteria for backflow protection. At the time of the inspection, the Owner must provide a copy of the device test reports and final approval from the local building official.

4. Failure to comply

Failure to properly install and test required backflow devices as required by this program may result in additional turn off/reconnection fees and/or a delay or denial of water and sewer service until all requirements are met.

VI. Existing Facilities

1. Inspection of existing facilities/hazard determination

(a) Customers' water supply systems shall be assessed annually for potential cross connection or backflow hazards. Assessment may be performed by voluntary inspections, interviews, surveys, or questionnaires. Interviews may be conducted on-site or by phone.
(b) A physical on-site inspection of the facility for hazard by Cross Connection may be required.
(c) If the on-site inspection reveals unmitigated real or potential cross connection hazards, a new backflow device or physical separation may be required.
(d) If required by the Cross Connection Inspector, you will be notified in writing of the type and location of backflow devices or separations that must be installed to protect the public water distribution system.

2. No Hazard Locations

If the building has been inspected and no hazards are found, then no backflow prevention assembly is required. An inspection of the site may be performed periodically to determine if changes have been made to the existing plumbing or structure. This is to assure continuing protection of the public water supply.

3. Residential Customer Self-Assessments

(a) In lieu of an annual assessment of residential connections, a continuous public education program will be provided to increase the awareness of cross connections and the public health hazards of backflow. The public education program will be designed to prompt residential customer self-assessments.

(b) The public education program will be a continuous program targeted to the residential customer and the business and industries serving the residential dwelling market, both rental and purchase. The cross connection control and backflow prevention program public education program will provide information on the following:
    i. Causes of backflow;
    ii. Hazards and health effects of cross-connections and backflow;
    iii. Resources available to identify actual or potential cross-connections;
    iv. Safeguards to use to eliminate or control the hazards at the point of use;
    v. Sources for additional information.

4. Installation of Approved Assembly

(a) Once notified that a backflow device is required on the service line, contact the local building department for proper permits and installation requirements.

(b) All backflow prevention device shall be of the approved type, shall comply with the Uniform Statewide Building Code, and shall be located between the meter and first point of use.

Where a backflow prevention assembly is required, such assemblies shall meet the following standards:

Reduced pressure principle backflow preventer and reduced pressure principle fire protection backflow preventer	ASSE 1013 USC Approved
Reduced pressure principle backflow preventer and reduced pressure principle fire protection backflow preventer	ASSE 1015 USC Approved
Reduced pressure detector fire protection backflow prevention assemblies	ASSE 1047 USC Approved
Reduced pressure detector fire protection backflow prevention assemblies	ASSE 1048 USC Approved

Customers installing new backflow devices on existing service connections must be wary of potential problems caused by thermal expansion. To prevent backflow, a closed piping system must have a means to safely accommodate or relieve the effects of excessive pressure caused from thermal expansion, such as an expansion tank required by USBC. Boilers and water heaters are a common source of backpressure backflow caused by thermal expansion. The Owner should take steps to mitigate thermal expansion to prevent damage to the homes plumbing. Contact the local building official or a licensed plumber for more information

5. Initial Test and Final Inspection

Once installed, inspection and initial testing of each backflow prevention device or assembly is required prior to final approval by the Authority. The Owner shall have the assembly tested by a DPOR certified backflow device tester and shall obtain final approval from the local building official for proper installation.

The Authority Cross Connection Inspector will then conduct a final visual inspection of the devices to assure that they meet the Authority's criteria for backflow protection. At the time of the inspection, the Owner must provide a copy of the device test reports and final approval from the local building official.

6. Failure to comply

Existing Service: Failure to properly install and test required backflow devices as required by this program may result in additional turn off/reconnection fees and/or a delay or denial of water and sewer service until all requirements are met.

VII. Fire Service Connections

1. Fire Service Connections Requirements (sprinkler systems and private fire hydrants)

New Construction

A double check valve assembly is required for all new fire service connections. The Authority may require a higher degree of protection following a thorough review of the application for service.

The Authority will perform plan review of any proposed water line extension up to the backflow prevention assembly. The gate valve and upstream pipe shall be properly restrained to allow for removal of the backflow preventer.

The Building Official of the particular locality will review plans for code enforcement regarding the internal fire system. **Contact your local building or fire official to see if they provide testing services for fire system related backflow devices in your area.**

Devices for fire service connections must meet the following ASSE standards:

Reduced pressure principle backflow preventer and reduced pressure principle fire protection backflow preventer	ASSE 1013 USC Approved
Reduced pressure principle backflow preventer and reduced pressure principle fire protection backflow preventer	ASSE 1015 USC Approved
Reduced pressure detector fire protection backflow prevention assemblies	ASSE 1047 USC Approved
Reduced pressure detector fire protection backflow prevention assemblies	ASSE 1048 USC Approved

Premises having booster pumps or fire pumps connected to the waterworks shall have the pumps equipped with a pressure sensing device to shut off or regulate the flow from the booster pump when the pressure in the waterworks drops to a minimum pressure as determined by hydraulic analysis and approved by the Authority. Minimum pressure shall not be less than 20 psi gauge at the service connection.

Maintenance responsibility of the Authority will end at the inlet gate valve installed prior to the fire protection backflow assembly. The assembly, valves and fire department connection, if required, shall be maintained by the property Owner.

Existing Fire Service Connections

A single check valve is not sufficient backflow protection. If a Double Check Assembly already exists, is in-line testable and there are no additives in the lines that would pose a high hazard, it may be accepted. If accepted, a copy of a valid test report must be provided upon request. Annual tests must also be completed by a certified tester and results submitted to the Authority's Cross Connection Program within 30 days of testing. **Contact your local fire official to see if they provide testing services for fire system related backflow devices in your area.**

Premises having booster pumps or fire pumps connected to the waterworks shall have the pumps equipped with a pressure sensing device to shut off or regulate the flow from the booster pump when the pressure in the waterworks drops to a minimum pressure as determined by hydraulic analysis and approved by the Authority. Minimum pressure shall not be less than 20 psi gauge at the service connection.

Maintenance responsibility of the Authority will end at the inlet gate valve installed prior to the assembly or at the right of way line. The assembly, valves and fire department connection, if required, shall be maintained by the property Owner.

Existing Double check valve assemblies may be located in a vault as long as proper drainage keeps the assembly from being submerged. It is the property Owner's responsibility to have drains cleaned out and to maintain the vault.

There shall be no connections of the domestic water supply to the fire sprinkler system downstream of the backflow preventer.

VIII. Irrigation Service Connections

All irrigation service connections are classified as high hazards and require a reduced pressure principle (RPZ) assembly. **Do not use an irrigation system without an adequate, properly functioning backflow protection device**. Pressure vacuum breakers are not acceptable.

The assembly must meet the following ASSE standard:

Reduced pressure principle backflow preventer	ASSE 1013 USC Approved

If notified by the Authority that an approved backflow preventer is required on an existing irrigation system, contact the local building department for a permit and installation requirements. All devices are to be installed per Uniform Statewide Building Code. Proceed with installation and testing of the device.

IX. Installation, Testing, and Maintenance

Installation

Installation shall be conducted by a licensed plumber in accordance with the Uniform Statewide Building Code. Contact the local building official for details.

Annual Testing

Annual testing of the required backflow prevention devices/assembly is the responsibility of the customer. The testing of the assembly shall be performed by a DPOR certified backflow device tester. You can verify that a tester is certified through the Department of Professional and Occupational Regulations by visiting their web site at http://www.dpor.virginia.gov/.

An annual test will be required for all backflow prevention assemblies on the anniversary month of the initial test. The initial and annual test shall be conducted by a Certified Tester, and the test report must be submitted to the Authority's Cross Connection Program within

30 days of testing. The certified test results shall be furnished to the Authority's Cross Connection Inspector. Initial and annual test reports will be maintained on file for a period of ten (10) years.

NOTE: In the City of Roanoke and Roanoke County annual inspection test reports shall be submitted to the localities building official. In Franklin and Botetourt Counties annual inspection reports shall be submitted directly to the Western Virginia Water Authority.

Submittals to the Authority can be made via email at:

ccinspection@westernvawater.org

Or delivered to: Western Virginia Water Authority
Environmental Programs Division
1502 Brownlee Avenue, S.E.
Roanoke, VA 24014

Maintenance

Assemblies that fail inspection shall be repaired or replaced in accordance with the manufacturer's recommendations.

X. Record Keeping

The Cross-Connection Control and Backflow Prevention Program will generate a large amount of information some of which is required to be maintained for a period of 10 years. Various data, report forms, notification letters will be stored in data management software. Management of the data may involve multiple departments and localities; however, the Authority Cross Connection Inspector is responsible for assuring the program data is complete and accessible.

The data to be stored and managed include but is not limited to:

1. An up-to-date listing of all customers
2. An up-to-date listing of consumer's water supply system Owners who have backflow, cross connection control devices or separations and air gaps installed
3. Details and specifications of each testable containment device
4. Cross connection control interview reports
5. Cross connection control testing reports
6. Questionnaire results

XI. Equipment

All testing equipment used by a Certified Tester is to be maintained and calibrated annually by the tester in accordance with the manufacturer's recommendations. It is the testing company's responsibility to schedule the calibration of their equipment and provide a copy of the calibration report to the Authority's Cross Connection Inspector within 30 days for the calibration. It is also the responsibility of the tester to provide all necessary equipment for testing backflow assemblies.

XII. Contact Information

The Cross Connection Control and Backflow Prevention Program is maintained by the Western Virginia Water Authority, Environmental Programs Division.

Cross Connection Program
1502 Brownlee Ave, SE
Roanoke VA 24014
540-494-2098

XIII. Non-Compliance

1. The Authority shall provide a written notice to the Owner of any building or structure that is found to be in violation of this program. The notice, shall identify the violation, and establish a reasonable deadline for the Owner to correct the violation. If the Owner fails to correct the violation before the expiration of the time given the Authority may suspend, or terminate water service.

2. If a backflow prevention device is removed or bypassed, if a cross-connection exists or if the pressure in the water system is lowered below twenty pounds per square inch (psi) gauge, the Authority, shall take whatever actions necessary to ensure that the water system is safe from pollution.

3. In addition to termination of service the Owner/tenant may incur fees for any failed re-inspection, for disconnection and reconnection of water service, and applicable administrative fees. Fees are identified in the Authority's Business Rules and Regulations. Charges will be applied to customers account and payment will be required before service is restored.