

**PROGRAM FOR  
CROSS CONNECTION CONTROL  
AND  
BACKFLOW PREVENTION**



**TOWN OF SMITHFIELD  
PUBLIC WORKS 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).

**I. Purpose**

The purposes of this program are:

- A. To 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 Public Works Supervisor shall be responsible for the inspection of the waterworks for cross-connection and backflow prevention control. 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 or contaminated or 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 prior to construction. The Director of Public Works shall review the plans and advise if the plans are approved or disapproved. If disapproved, the designer and the Director of Public Works 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 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 severe in degree of hazard requiring total containment will be surveyed first. Services designated moderate and minor in degree of 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 A 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 Waterworks Operator. Backflow prevention devices shall be of the approved type as set forth in Section 2.28A of the Commonwealth of Virginia Waterworks Regulations. 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:  
The following types of facilities require the installation of an approved backflow prevention device at each service connection:
  - A. Hospitals, mortuaries, clinics, veterinary establishments, 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. Car washes and laundries;
  - J. Lawn sprinkler systems, irrigation systems;
  - K. Fire service systems;
  - L. Slaughter houses and poultry processing plants;
  - M. Farms where the water is used for other than household purposes;
  - N. Radioactive materials processing plants or nuclear reactors;
  - O. Commercial greenhouses and nurseries;
  - P. Health clubs with swimming pools, therapeutic baths, hot tubs or saunas;
  - Q. Paper and paper products plants and printing plants;
  - R. Pesticide or exterminating companies and their vehicles with storage or mixing tanks;
  - S. Schools or colleges with laboratory facilities;
  - T. High-rise buildings (4 or more stories);
  - U. Multiuse commercial, office, or warehouse facilities;
  - V. 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: Table 2.15 provides a listing of types of connections, degree of hazard and recommended minimum types of prevention devices necessary. Reference should also be made to Article 3 of Part II of the Virginia Waterworks Regulations, a copy of which is contained in the Appendix A.
4. Location: Backflow preventing devices shall be readily accessible, preferably in the same room with the fixture they serve. 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 or his authorized agent.
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 Waterworks Operator on a form provided by the Superintendent of Public Works. See Appendix.

## **VII. Enforcement**

1. A notice will be issued to property owners to have backflow prevention device installed and/or tested annually. Test results must be submitted to the Backflow Prevention Manager within 60 days.
2. If test results are not received within 60 days, a Notice of Non-Compliance will be issued by certified mail to the property owner providing 30 days to comply.
3. If a property owner fails to comply by providing test results or evidence of installation of a backflow prevention device, whichever may apply, then a second Notice of Violation will be issued by certified mail to the property owner. If after 7 days a property owner has failed to comply then the Town may shut off water service to the subject property until the property owner complies with these requirements.

## **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. Backflow Device Report
2. Letter to Homeowner Concerning Cross Connection
3. Cross Connection Survey
4. Cross Connection Inspection Form
5. Part II, Article 3, "Cross Connection Control and Backflow Prevention in Waterworks" of the Virginia Waterworks Regulations.