

# **Cross-Connection and Backflow Prevention**



Provided by:

**The Department of Public Works  
The Town of Purcellville, VA**

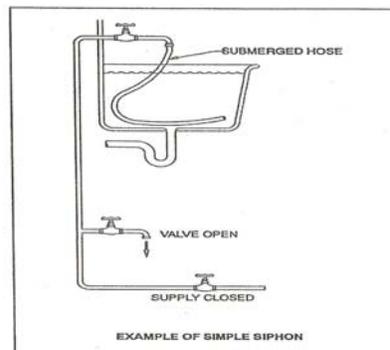
## What is a Cross-Connection?

A cross-connection is a link between a potable water system (water that is safe to drink) and a nonpotable system (water or other liquids that are not considered safe to drink or are of questionable quality), such as:

- 1) Another water supply of inferior quality (for example, a private well that is not monitored regularly)
- 2) Chemical solutions and toxic (poisonous) substances (such as corrosion inhibitors, cleaning and metal plating solutions, antifreeze)
- 3) Nonpotable water (untreated water used in industrial processes, auxiliary supplies used for fire fighting)
- 4) Nontoxic (not poisonous) liquids that should not be in the potable water system (beverages such as beer, wine, milk)

A cross-connection can allow undesirable liquids to enter the potable water system through piping systems such as boiler feed lines, chemical mixing vats or temporary connections like hoses or submerged lines. In the presence of a cross-connection, a strong backflow can draw liquid from nonpotable sources and pull it back into the public waterworks creating contamination.

Public health becomes a great concern as the contamination typically occurs after the water has been treated. Serious health-related problems can arise such as waterborne diseases like hepatitis and typhoid and poisoning from ingesting toxic substances like pesticides or boiler treatment chemicals. Contamination may be confined to a single building or may involve an entire community.



As the supplier, the Town has the responsibility to provide safe drinking water to the public. By treating, disinfecting and testing the water to be sure it meets Virginia Department of Health (VDH) standards for drinking water, the Town takes all necessary steps to ensure that the water entering the distribution system is safe.

It is also the Town's responsibility to protect the water quality once the water enters the distribution system. This system includes pumps, valves, meters and all of the piping that connects the water plant to your water service. Some types of contaminants such as petroleum-based products, for instance, are very difficult, if not impossible, to thoroughly remove from the system once they are introduced. Removal of these contaminants may require replacement of distribution system components and an interruption of water service to the public.

Cross-connection devices ensure that the water and the distribution system is protected. Investing in adequate protective devices such as backflow preventers and maintaining them with annual inspections not only protects the public water system, but protects the public as well. The Town has implemented a Cross-Connection and Backflow Prevention program to partner with all Town users to ensure water quality is maintained throughout the distribution system.

### **Conditions that Lead to Backflow**

In order for potable water to be contaminated by a nonpotable substance through a cross-connection, two conditions must exist simultaneously:

- 1) A force that causes liquids in a system to move
- 2) A link that connects the two systems

Backflow is liquid flowing through a pipe in the opposite direction from the direction it was intended to flow. Since a liquid always moves toward the point of the lowest pressure, a common appliance such as a hot water heater which can increase pressure and can cause a backflow into the public water supply.

A water break or heavy pull for fire suppression can also be the source of a backflow situation. Without backflow prevention, toxic chemicals would have the opportunity to enter the system, making it critical to be sure appropriate devices are in place and functioning properly.

## Cross-Connection and Backflow Prevention Program

In 1995, the Virginia Department of Health adopted the Clean Water Act requiring all waterworks owners in the State of Virginia to monitor, test and report to the VDH the results of water quality testing. As part of this Act, a cross-connection and backflow prevention program must be in place.

The Town has adopted a program which requires appropriate protection against backflow to be installed and maintained. The type and location of protection depends upon the type of business and degree of hazard that is present. Degree of hazard is divided into three categories:

<u>Hazard Level</u>	<u>Hazard Risk</u>	<u>Types of Hazards or Activities</u>	<u>Suggested Devices</u>
High	Contamination could cause serious illness or death, if consumed.	Medical, dental, laboratories, mortuaries, below grade lawn sprinkler systems, facilities that use chemicals for processing; fire sprinkler systems	Reduced pressure zone assembly (testable devices); Air gap
Moderate	Contamination could cause mild illness or discomfort. Not life-threatening.	Car washes, dishwashers, clothes washing, toilet tanks, solar heating systems	Air gap; Atmospheric vacuum breaker; Pressure vacuum breaker
Low	Contamination would be aesthetically objectionable, but does not affect health.	Private wells, food coolers, beverage dispensers, hose bibb	Air gap; Atmospheric vacuum breaker

The table above is shown as a general reference and is not intended to be all-inclusive.

As part of this program, water users that need to employ backflow prevention devices are required by law to have the devices inspected and tested and the findings reported to the Town annually. The inspection and testing must be performed by a qualified, licensed plumber that is certified as a Backflow Prevention Device Worker by The Board for Contractors, Department of Professional and Occupational Regulation, Commonwealth of Virginia.

A Backflow Prevention Inspection/Testing form provided by the Town must be completed by a certified plumber to demonstrate an appropriate device is in place and functioning properly. The business owner is responsible for submitting this form to the Town. Failure to provide this information within a specified period of time could result in a disruption of water service.

The Backflow Prevention Inspection/Testing form will be kept on file as evidence that the water user has completed the required maintenance and testing inspection should the information be requested by the VDH or should a backflow situation arise.

## **Maintenance**

Backflow prevention devices are required to be inspected and tested annually. Most devices require an overhaul every five years to replace the internal rubber components and could require other repairs if testing fails. Those devices that are deemed to be untestable are required to be replaced at a minimum of every five years, and more frequently if an inspection indicates leakage, corrosion or other potential cause for failure. Any receipts for repair or replacement of a backflow prevention device should be maintained as evidence that the required maintenance was performed. The Backflow Prevention Inspection/Testing form should record any maintenance or repair activities since the last inspection and testing.

## **Residential Cross-Connection and Backflow Prevention**

Businesses are not the only ones required to have backflow prevention devices installed. Many residential applications require monitoring and maintenance as well. Hoses left submerged in swimming pools, hoses in elevated locations above an outside spigot while watering shrubs, or having chemical sprayers attached while weed killing are all conditions that can be extremely hazardous.

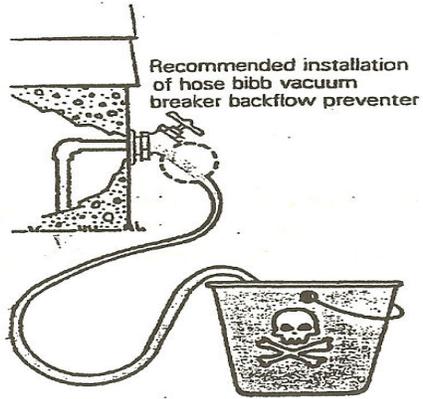
Other potential hazards can apply if hoses are left lying on the ground where contaminants such as fertilizer, garden chemicals, or cesspools exist.

Yard hydrants (that drain into the ground when turned off) need an approved backflow prevention device installed on the line feeding the hydrant. All hose bibbs, both inside and outside, except those for dishwashers and washing machines require vacuum breakers. Caution should be taken during cold weather as a vacuum breaker may prevent a spigot from draining properly and could allow the wall hydrant to freeze. Read the manufacturers recommendations for winter draining or purchase the type that self drain.

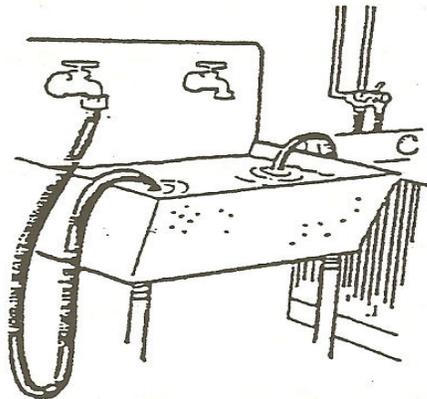
The water closet on a commode can also be a source of backflow allowing cleaning solutions to be siphoned back into the water system. Anti-siphon devices are readily available at your local hardware store.

Examples of how backflow can occur and ways to protect against it can be found on the following pages.

## Basic Types of Cross-Connections and the Recommended Backflow Device



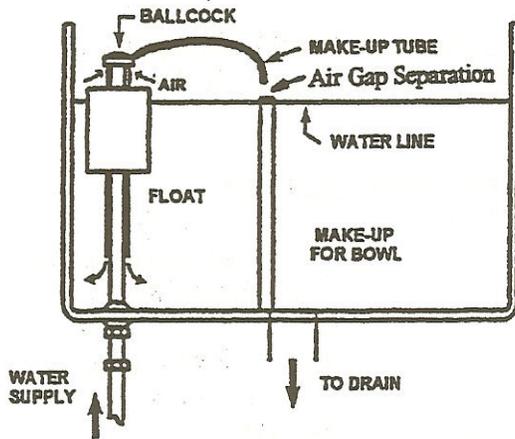
Hose Bibb Vacuum Breaker



Laundry Tub with Threaded Spigot

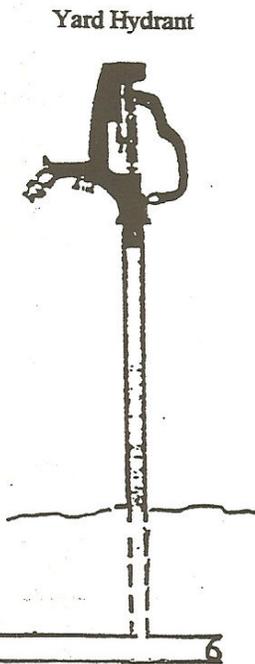
Hose Bibb Vacuum Breaker required

**Basic Types of Cross-Connections and the Recommended Backflow Device**



Anti-Siphon Flush Tank

By installing an anti-siphon device in the water closet, backflow is prevented.



This device causes water to seep out through weep holes. Other materials can enter the weep holes and contaminate water. A back flow prevention device, such as a dual check valve (DCV) is required on the service line to the yard hydrant.

## **New Businesses**

If a new business opens in Town, it is the responsibility of the owner to determine if a hazard exists and protect against that hazard, however small, from the possibility of affecting the water supply. If a residential consumer adds a new bathroom fixture, a lawn sprinkling system or other amenity that may cause backflow, the responsibility for protecting against a hazard is that of the owner.



All consumers of public water need to be aware of the possibilities of contamination and the methods available to combat backflow and cross-connections. Maintaining safe drinking water requires everyone's participation.

## **Compliance with the Cross-Connection and Backflow Prevention Program**

Annually, the Town will send a form to all water users considered to be potentially in need of backflow prevention. This would include those businesses or residences considered to have a high or moderate risk as discussed earlier. This form is required to be completed by a licensed, state-certified plumber after inspection and testing when necessary of all backflow prevention devices and returned to the Town Office within 30 days.

Those that do not comply with this requirement will be sent a reminder letter and allowed an additional 30 days to comply with the request. After 30 days, the Town will assume that a cross-connection exists and will discontinue water service until the form is received by the Town. This precaution is taken to ensure that the public's drinking water system is protected.



The Town of Purcellville would like to thank you for your assistance in the protection of our public water system.

We hope that the information contained in this brochure was helpful.



Should you require more information, contact :

**Town of Purcellville  
Department of Public Works  
(540) 751-2339**



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