Effective Cross Connection Control Programs

Hip Pocket Tools for Operators

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VDH VIRGINIA DEPARTMENT OF HEALTH
Protecting You and Your Environment
www.vdh.virginia.gov

Office of Drinking Water
Safe Drinking Water for a Healthy Virginia

At the end of this session…

You will be able to understand what a cross connection is (back flow, back pressure, backsiphonage), understand the need for an active program to address cross connections, identify essential elements of an on-going program, and understand the importance of good reporting and recordkeeping.

What is a cross connection?

A cross connection is any actual or potential link or connection between your drinking water system and any source of contamination.

Cross connections can occur due to backpressure or backsiphonage, which together are kinds of backflow.

Backflow is the reversed flow of contaminated water or other liquids into your drinking water system.

Did you know…?

Cross connections can occur anywhere

- Lawn chemicals backflowing through a garden hose
- Backsiphonage of "blue water" from a toilet into a building's water supply
- Backpressure of boiler water into an office building water supply
- Backflow from a fire sprinkler system

Backflow by backsiphonage occurs when a partial vacuum causes the water flow to reverse, and contaminants are siphoned or sucked into your drinking water.

Backflow by backpressure occurs when contaminants under pressures greater than the pressure in your drinking water system are pushed into your drinking water.

Can you think of a situation at your drinking water system where backflow might be a problem? Is the situation related to backsiphonage or backpressure?

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Should I be concerned about cross connections?

Two examples from drinking water systems in Virginia highlight the seriousness of cross connections.

1. An exterminating company was using a water hose connected to a house to mix a chemical pesticide in a tank truck. At the same time, city workers were draining a distribution line serving the subdivision. The pesticide was drawn into the distribution system by backsiphonage. When water service was restored, water contaminated with the pesticide flowed directly into homes. For the lack of an inexpensive hose bibb vacuum breaker, this backflow event caused approximately $80 million in damages to the drinking water system and homes, where plumbing and appliances had to be removed and replaced.

2. A resident called the waterworks claiming, "Your water is burning my mouth!" The woman lived in an apartment located over a convenience store. The investigation showed that a pressurized canister of carbon dioxide used to mix sodas in the store had malfunctioned. As a result, carbon dioxide was forced into the drinking water piping by backpressure. The levels of carbon dioxide were high enough to burn the woman's mouth. If metallic pipe had been in use, the acidic mix of carbon dioxide and water could have led to serious illness or death.

What can I do to prevent cross connections?

Having an <u>active program</u> in place to control cross connections and prevent backflow is critical to ensuring the safety of your drinking water.

Did you know…?

Having an approved Cross Connection Control Program is not an option for public water systems? The Virginia *Waterworks Regulations* state:

> "…as a condition for the issuance and continued use of the operation permit …each owner of a waterworks [shall] establish and enforce a program of cross connection control and backflow prevention for each waterworks. The cross connection control and backflow prevention program shall be approved by the division prior to issuance of the operation permit." §12VAC 5-590-580

What are the essential elements that make up an effective ongoing Cross Connection Control Program?

There are six key elements of an effective Cross Connection Control program (CCCP):

1. Consumer education and awareness

Your best resource to ensure an effective CCCP is consumers who know what a cross connection is, and how to safeguard against backflow at home, at school, or in the workplace.

Educational materials for consumers should describe…

- Conditions that lead to backflow
- Plumbing hazards with cross connection potential
- Health effects of cross connections
- Ways to eliminate hazards
- Sources of additional information and contact info for assistance

Ways to reach consumers include…

- Using the annual water quality report (also known as a Consumer Confidence Report) to explain your CCCP. Describe steps water customers can take, such as installing hose bibb vacuum breakers to prevent backsiphonage when using the garden hose.
- Sending educational materials as a billing insert
- Making Public Service announcements on local television or radio
- Providing education materials when new customers begin service
- Posting consumer education materials on employee bulletin boards

Did you know…?

An excellent resource for finding educational materials for your drinking water customers is the University of Southern California Foundation for Cross-Connection Control and Hydraulic Research. Visit their web site at http://www.usc.edu/dept/fccchr/#

Another good source for consumer information is the University of Florida's TREEO Center web site at www.nobacklfow.com .

Can you think of other ways or opportunities to provide educational materials to consumers served by your drinking water system?

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2. Risk assessment

What conditions are you likely to encounter in your water supply's service area? Before you determine what kind of cross connection protection is best, you have to evaluate situations that can produce backflow. This evaluation or risk assessment must be done for every service connection in your system. You must think about how water is used by consumers. Risk assessment involves two steps:

> Did you know…?
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> The Virginia *Waterworks Regulations* provides guidance for ranking the degree of hazard for potential cross connections as high, moderate, or low "based on the nature of the contaminant; the potential of the health hazard; the probability of the backflow occurrence; and the effect on waterworks structures, equipment, and appurtenances used in the storage, collection, purification, treatment, and distribution of pure water." § 12 VAC 5-590-620

Step 1: Identify the conditions or facilities with potential for backflow.

Step 2: Assign a degree of hazard. This is based on the nature of the contaminant and its potential health effects.

What cross connection risks might exist at your drinking water system?

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3. Selection of appropriate safeguards

Appropriate safeguards are tailored to the situation, based on degree of hazard, method of backflow (backsiphonage or backpressure), and pressure and flow conditions (continuous or non-continuous.)

An air gap or physical disconnection gives the highest degree of protection from backflow. It should be used whenever it is practical to do so in high hazard situations. The length of the gap should be at least two times the diameter of the water outlet.

When use of an air gap is not suitable, a variety of backflow prevention devices can be installed. The table below describes the appropriate application of mechanical safeguards for various situations:

Degree of Hazard	Method of Backflow	Pressure or Flow Conditions	Device or Safeguard
High	Back pressure OR backsiphonage	Continuous	Reduced pressure principle backflow prevention assembly (RPZ)
	Backsiphonage ONLY	Non-continuous	Pipe applied atmospheric vacuum breaker, hose bibb vacuum breaker, or wall hydrant with hose bibb vacuum breaker
		Continuous	Pressure vacuum breaker
Moderate	Back pressure OR backsiphonage	Continuous	Double gate-double check valve assembly
Low	Backsiphonage ONLY	Continuous	Dual check valve

Continuous means operating under continuous flow or pressure. This condition usually applies to devices that are installed inline, where valves may be installed downstream of the device.

Noncontinuous means operating intermittently, and applies to devices which are connected to hose bibbs, hydrants, or faucets that are open to the atmosphere. In these cases, valves are not located downstream of the device.

(1) Reduced pressure principle backflow prevention assembly (RPZ) (2) Hose bibb vacuum breaker
(3) Pipe applied atmospheric vacuum breaker (4) Wall hydrant with hose bibb vacuum breaker
(5) Pressure vacuum breaker (6) Double gate – double check assembly (7) Dual check valve

What would be suitable safeguards for the situations you previously described?

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4. Ongoing reassessment

The number of connections to your water system and the ways consumers use water from your system are constantly changing. How will you know when these changes occur, and whether they introduce new risks to your water system?

In order to have an effective CCCP, you must make an effort to continually reassess your drinking water system for cross connections. The Virginia *Waterworks Regulations* require that water system owners have inspections and appropriate testing of cross connection control devices conducted annually. Inspections should include examination of cross connection controls currently in use, as well as investigation to identify new potential cross connection situations. The *Regulations* require that records of the reassessment inspections be kept for at least ten years.

5. Recordkeeping

Recordkeeping is an essential part of effective CCCPs. Good recordkeeping serves numerous purposes:

- It enables you to pinpoint the location and type of potential cross connections that could affect your water system.
- It serves as an inventory of the safeguards that are used throughout the water system and why they are there.
- It allows you to assess how well the CCCP is being implemented.
- It serves as a resource to make sure that testable devices are being inspected and maintained properly.
- It provides accountability, by documenting who is performing specific CCCP tasks.
- It protects the water system from liability and charges of negligence.

All CCCPs include a recordkeeping element, though the specific documentation may vary from waterworks to waterworks. However, all CCCP records must to be saved for a minimum of ten years, and the

records must be made available to the Virginia Department of Health upon request. The records maintained by your waterworks may include the following:

- Results of questionnaires sent to customers
- Annual inspection forms
- Lists of potential cross connections (description and location)
- Inventories of the safeguards used for each potential cross connection, along with the reason for its selection
- Specific descriptions for each safeguard including manufacturer, model number, size, etc.
- Documentation of annual device testing, including testers' certifications, inspection dates, test results, etc.

What CCCP records are required for your water system? How might records make it easier to respond to or correct a cross connection incident?

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6. Reporting

It is very important to notify the Virginia Department of Health IMMEDIATELY in the event of a cross connection or backflow incident at your public water system. Call your Office of Drinking Water field office if there is any indication or suspicion that contaminated water has entered the water system by backflow. Office of Drinking Water staff will provide specific guidance on correcting the situation, and on steps you should take to notify consumers. Prompt reporting is a necessary step to protect the health of your customers.

Did you know…?

The Office of Drinking Water has established toll-free emergency contact call numbers for waterworks use after normal business hours on nights, weekends, and holidays. Your emergency call will be delivered to a pager, and the call will be returned immediately.

(800) 608-3212
or
(804) 204-3527

More information on cross connection control and backflow prevention can be found at…

www.usc.edu/dept/fccchr/ and www.nobackflow.com

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Send comments to ODWReview@vdh.virginia.gov Attn: Small Systems Coordinator

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