

Cross Connection Control Practice

Practice Number: PRA – OPS03/01

Applicability: American Water Works Company, Inc., and its controlled subsidiaries (together “American Water” or the “Company”)

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I. PURPOSE

This practice provides the basis for American Water’s cross connection control program. A cross connection control program is a necessary component of a larger program to protect the integrity of drinking water in the distribution system. The goal of the cross connection control program is to protect the public potable water supply served by American Water from the possibility of contamination or pollution by containing within the customer’s internal distribution system or the customer’s private water system, such contaminants or pollutants that could backflow through backsiphonage or backpressure into the public water system. High level practice variances related to market-based business (MBB), if any, are outlined in section IV of this document.

II. SUMMARY

The following are the major sections covered within the Key Activities section of this practice:

- Section 1: General Provisions
- Section 2: Evaluating the Need for a Backflow Prevention Assembly
- Section 3: Assembly Requirements
- Section 4: Assembly Location
- Section 5: Backflow Prevention Assemblies
- Section 6: Letter Generation
- Section 7: Termination for Non-Compliance
- Section 8: Organizational Responsibilities
- Section 9: Reporting / Metrics

This practice contains appendices for the following:

- Appendix A: Suggested Types of Backflow Protection
- Appendix B: Glossary of Terms for the Cross Connection Control Program
- Appendix C: Summary of Policies Related to the Cross Connection Control Practice

III. KEY ACTIVITIES

The following sections detail enterprise activities involving Cross Connection Control

Section 1: General Provisions

1. This practice is designed to set minimum requirements across American Water. Where state or local requirements are more stringent or are in conflict with this practice, the state or local requirements will prevail.

2. Unprotected cross connections with the public water supply are prohibited and American Water reserves the right to require any assembly as necessary to protect its water supply from potential contamination sources.
3. When necessary, systems should acquire the appropriate state or local authority to implement and enforce a cross connection control program.
4. When deemed necessary by the Water Company as required under its tariff or State regulations, the installation of a backflow assembly will be required as a condition for continued service for existing customers and before new service will be granted for new customers.
5. American Water has no responsibility over water systems on private property and takes no legal responsibilities for their safe operation.
6. Temporary connections to the public water supply are prohibited unless authorized by the Water Company in writing. If a temporary connection is permitted, the proper metering and backflow prevention assembly, as approved by the Water Company, will be required.

Section 2: Evaluating the Need for a Backflow Prevention Device

1. For non-residential customers, American Water will perform an evaluation to determine if a backflow prevention assembly is needed, and if so, the type of backflow assembly required to be installed. This determination will be based on information provided to the state cross connection control team by the premise via a paper survey, an on-site inspection by a cross connection control expert from the Water Company, and other means available to the state cross connection control program.
2. Evaluations will occur according to the following schedule:
 - a. All non-residential customers will undergo an initial evaluation.
 - b. New non-residential customers and change of ownership / change of occupancy at the premises of non-residential connections will be evaluated at the time service is requested.
 - c. Each operating company shall develop a schedule not exceed 5 years from adoption of this practice for completing one round of evaluations (e.g., evaluation of customers that have never been evaluated); subsequent evaluations will occur at the discretion of each individual operating company or as required by state and / or local requirements for conducting such evaluations.
3. Evaluations of residential customers will be at the discretion of each individual operating company or as required by state and / or local requirements.

Section 3: Assembly Requirements

1. The type of backflow assembly that shall be required shall be commensurate with the degree of hazard that exists on the customer's premises as determined by the Water Company. A list of risk levels and associated assemblies will be maintained on the Environmental Page of the internal American Water Intranet (which is not available to the general public).
2. American Water reserves the right to require any assembly as deemed necessary to protect its water supply from potential contamination sources.
3. Failure by the customer to complete a survey or allow for an inspection to determine the level of risk at a premise will result in a determination that the highest level of protection is required.
4. The water customer may choose a higher level of protection than required by the Water Company.

Section 4: Assembly Location

1. This program is designed for containment protection of the distribution system and requires the water customer to install, at the customer's expense, an approved backflow prevention assembly.
2. Wherever backflow protection is determined to be required on a water customer's premises, all water supply lines from the Water Company's mains entering such premises shall be protected by an approved backflow prevention assembly. The assembly should be located as close to the meter as practical and before any branching occurs, with the exception of underground sprinkler systems and boilers where the assembly may be installed on the branch line servicing the sprinkler system / boiler.

Section 5: Backflow Prevention Assemblies

1. Approved Backflow Prevention Assemblies
 - a. Only backflow prevention assemblies which are approved by one of the following shall be used: the Research Foundation for Cross Connection Control of the University of Southern California (USC), American Water Works Association (AWWA), American Society of Sanitary Engineering (ASSE), or American National

Standards Institute (ANSI), or certified by the National Sanitation Foundation (NSF) to be in compliance with industry specifications.

2. Types of Backflow Prevention Assemblies

- a. The types of backflow prevention assemblies that may be required include, but are not limited to: Residential Dual Check Valve (RDC), Double Check Valve Assembly (DC) with or without detection meters, Reduced Pressure Principle Backflow Prevention Assembly (RP) with or without detection meters, and Air-gap separation (AG).

3. Backflow Prevention Assembly Installation

- a. Installation will be in accordance with all applicable state and local plumbing codes, in accordance with the manufacturer's instructions, and as approved by appropriate organizations listed in A.1 above. The assembly should be located as close to the meter as practical and before any branching occurs, with the exception of underground sprinkler systems and boilers where the assembly may be installed on the branch line servicing the sprinkler system / boiler. The customer must not remove the meter. The assembly should be installed by a Qualified Backflow Assembly Installer and tested at the time of installation (see Section D for more information on Testing).
- b. Backflow prevention assemblies shall be located in an area that provides a safe environment for testing and maintenance. The area should be easily accessible, dry, and free from dirt/debris, extreme cold, heat, and electrical hazards. RPs should not be installed in locations where they may be subject to freezing and/or flooding conditions; this would include pits and below ground chambers that do not have adequate drainage. Also, if water which may be discharged from these assemblies could cause damage, it should be piped via an air gap to a drain or other suitable location.
- c. If an uninterrupted supply of water is required to a facility, backflow assemblies must be installed in parallel to allow for testing and maintenance.
- d. A pressure loss through the backflow prevention assembly will be experienced by the customer. The pressure reduction varies with the size and type of assembly installed. The customer will be responsible for providing any increase in pressure required as a result of the pressure loss through the backflow prevention assembly.
- e. Installation of a backflow prevention assembly will create a closed system. Therefore, pressure buildups as a result of heating or other means will not be alleviated through this assembly. Customers should be advised of this and the need for a temperature/pressure relief valve or expansion tank within their system.
- f. The need for replacement of existing backflow prevention assemblies that do not meet all of the above installation requirements will be determined by the Water Company on a case by case basis.
- g. Standard installation details are determined by local regulatory requirements. No standardized AW installation diagram is available.

4. Backflow Prevention Assembly Testing and Maintenance

- a. The customer(s) at any premises on which, or on account of which, a backflow prevention assembly is installed, shall be responsible for having the assembly(s) tested by a Qualified Backflow Assembly Tester. A list of approved testers will be made available to customers when possible (e.g., link on the web site).
- b. A backflow prevention assembly shall be tested after installation, relocation or repair, and annually thereafter, unless more frequent testing is required by applicable state or local regulations. This should include irrigation systems so as to protect the water system in the event the customer places an inactive irrigation system into service.
- c. No assembly shall be placed in service unless it is functioning as required and a unit shall be serviced, overhauled, or replaced whenever it is defective.
- d. The Water Company will notify affected customers by mail when testing of an assembly is needed. The Water Company will also supply the customer with the necessary test form or direct that customer to where the test form can be found. A test form will need to be completed each time an assembly is tested, installed,

relocated, or repaired. The American Water test form is the preferred form to be used, but other forms, approved by the Water Company, may be accepted.

5. Backflow Prevention Assembly Relocation, Repair, or Replacement

- a. Relocation: An assembly may be relocated so long as the relocation will continue to provide the required protection and satisfy installation requirements. Removal and reinstallation of the assembly must be done by a Qualified Backflow Assembly Installer. A retest is required following the relocation of the unit(s).
- b. Repair/Replacement: An assembly may be removed for repair or replacement, provided the service line is shut off and water use is discontinued until the repair/replacement is completed and the assembly is returned to service. Alternatively, the service connection may be equipped with other temporary backflow protection, approved by the Water Company, if continuous service is required. A Qualified Backflow Assembly Installer must perform repair or replacement of the assembly. All replacement assemblies must be approved by the Water Company and must be commensurate with the degree of hazard present. A retest is required following the repair or replacement of the assembly.

Section 6: Letter Generation

1. The cross connection control program will use an automated system to send letters to customers. The system will be set so as to send initial letters and reminder letters prior to the due date. Individual states will be able to set the “days before” that each of these letters will be sent to customers. Examples of letters that will be sent include: Test, Install, Upgrade, Repair/Replace, Survey, and Inspection.

Section 7: Termination for Non-Compliance

1. When the Water Company encounters a water customer connection that represents a clear and immediate hazard to the public water supply, and the hazard cannot be immediately abated, the Water Company shall immediately institute the procedures for discontinuing the water service. The Water Company will notify the water customer of the reasons for discontinuing the water service and the corrective action to be taken by the water customer before the service can be restored. This will be done in accordance with all applicable customer service rules and regulations.
2. When a cross connection exists at a customer’s connection, conditions for water use that create a basis for water service termination shall include, but are not limited to, the following items:
 - a. Refusal to install a required backflow prevention assembly,
 - b. Refusal to test a backflow prevention assembly,
 - c. Refusal to repair a faulty backflow prevention assembly,
 - d. Refusal to replace a faulty backflow prevention assembly,
 - e. Direct or indirect connection between the public water system and a sewer line,
 - f. Unprotected direct or indirect connection between the public water system and a system or equipment containing contaminants,
 - g. Unprotected direct or indirect connection between the public water system and an auxiliary water system,
 - h. A situation that presents an immediate health hazard to the public water system.

Section 8: Organizational Responsibilities

1. Each operating company will need to determine how to divide the following responsibilities across the different functional areas:
 - a. Evaluating customers (e.g., sending out surveys, performing on-site assessments, etc.)
 - b. Sending out letters
 - c. Entering survey results / test results
 - d. Reviewing surveys / test results and making evaluations as to the need for additional action (e.g., on-site inspection, new assembly installation, etc.)
 - e. Customer education / awareness on cross connection control

Section 9: Reporting / Metrics

1. American Water will track the following statistics for non-residential customers to show progress in implementing this practice. These statistics will be tracked at the local level and reported at the state and American Water levels.
 - a. Services Evaluated / Devices Installed – making sure that assemblies are installed where needed
 - i. Number and percentage of assemblies installed for non-residential customers
 - ii. Number and percentage of non-residential customers where a determination has been made that an assembly is not needed
 - iii. Number and percentage of non-residential customers needing to install an assembly that have not yet installed a device
 - iv. Number and percentage of non-residential customers needing to be evaluated
 - b. Assemblies Tested
 - i. Number and percentage of assemblies tested as required
2. State and local operations may track additional metrics to monitor their program and determine where to direct resources. This may include action taken regarding residential customers.

IV. MARKET-BASED BUSINESS VARIANCES

Market Based Business with responsibility for drinking water systems should review said operations to determine if a cross connection program consistent with this practice is already in place. For those operations without such a program in place, Market Based Business should inform the client, in writing, of the American Water's position on the need to implement a cross connection control program and recommend that owner implement such a program (with involvement as appropriate and allowed under the existing contract or by supplemental contract).

V. WAIVERS

Any deviation, waiver or exception from this practice requires the prior written approval of the Document Approver of this practice. If the deviation, waiver or exception conflicts with any policy, approval from the ELT Sponsor of that policy is required. The Document Approver, or her or his designee, is responsible for tracking all requests for waivers, decisions with respect to those requests, and maintaining documentation related to each waiver request. Each individual receiving a waiver is responsible for retaining documentation of the waiver that was granted.

VI. DEFINITIONS

- See Appendix B

VII. NON-COMPLIANCE

Any employee who violates or circumvents the practice may be subject to disciplinary action up to and including termination.

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Appendix A: Suggested Types of Backflow Protection

Degree of Hazard	Suggested Type of Backflow Prevention
1. Sewage and Hazardous Substances	
a. Premise where the public water system is used to supplement the reclaimed water supply.	AG
b. Premise where there is a wastewater pumping and/or treatment plant and there is no interconnection with the potable water system. This does not include a single-family residence that has a sewage lift pump.	RP
c. Premise where reclaimed water is used and there is no interconnection with the potable water system.	RP
d. Premise where hazardous substances are handled in any manner in which the substances may enter a potable water system. This does not include a single-family residence that has a sewage lift pump.	RP
e. Premise where there is an irrigation system into which fertilizers, herbicides, or pesticides are, or can be, injected.	RP
2. Auxiliary Water Supplies	
a. Premise where there is an auxiliary water supply which is interconnected with the public water system.	RP or DC
b. Premise where there is an auxiliary water supply, or gray-water system, and there is no interconnection with the public water system.	RP
3. Fire Protection Systems	
a. Class I, II – Where the system is constructed of piping material not approved as potable water system material per the 1994 Uniform Plumbing Code and the system has a Fire department Connection or is a looped system.	DC
b. Class III – VI – Premises where there is an auxiliary water supply on or available to the premise and/or there are chemicals added to the system, such as but not limited to: Anti-freeze.	RP
4. Premises where entry is restricted so that inspections for cross-connections cannot be made with sufficient frequency or at sufficiently short notice to ensure that cross-connections do not exist.	RP
5. Premises where there is a repeated history of cross-connections occurring.	RP
6. Sale for Resale Customers (water sold to other municipalities/districts for resale to the municipalities' / districts' customers).	RP or DC
7. Residential customer with a looped fire protection system within its internal plumbing	RDC (Check in CA)
8. Residential customer with lawn irrigation system connected to their potable water supply	RP

Appendix B: Glossary of Terms for the Cross Connection Control Program

Air-Gap Separation (AG): The term "air-gap separation" means a physical break between a supply pipe and a receiving vessel. The air-gap shall be at least double the diameter of the supply pipe measured vertically above the flood rim of the receiving vessel, in no case less than one inch.

Approved Backflow Prevention Assembly (Device): Any testable assembly that is approved by one of the following: the Research Foundation for Cross Connection Control of the University of Southern California (USC), American Water Works Association (AWWA), American Society of Sanitary Engineering (ASSE), or American National Standards Institute (ANSI), or certified by the National Sanitation Foundation (NSF) to be in compliance with industry specifications.

Auxiliary Supply: Any water supply on or available to the premises other than the approved public water supply.

AWWA Standard: An official standard developed and approved by the American Water Works Association (AWWA).

Backflow: The undesirable reversal of the normal flow of water or mixtures of water and other liquids, gases, or other substances into the distribution system of the public water supply due to backpressure and/or backsiphonage.

Backsiphonage: Backflow resulting from a negative or reduced pressure in the water distribution supply.

Backpressure: The flow of a substance from a customer's pressurized system through an unprotected cross-connection back into the potable water supply.

Containment: Protection of the public water system is maintained by the application of a proper backflow prevention assembly on the service line feeding the customer's service or building so that any contamination is contained within the premises and does not enter the pipelines of a public water system.

Contamination: An impairment of the quality of potable water by sewage, industrial fluids, waste liquids, compounds or other materials to a degree which creates an actual or potential hazard to the public health through deterioration of water quality.

Cross-Connection: Any connection between a public water system used to supply water for drinking purposes and any source or system containing unapproved water or a substance that is not or cannot be approved as safe, wholesome, and potable. By-pass arrangements, jumper connections, removable sections, swivel or changeover assemblies, or other assemblies through which backflow could occur, shall be considered to be cross-connections. The term "direct cross-connection" shall mean a cross-connection that is subject to both backsiphonage and backpressure from a permanent connection. The term "indirect cross-connection" shall mean a cross-connection that is subject to backsiphonage only and backpressure from a temporary connection.

Designated Backflow Prevention Specialist: The designated Water Company employee(s), trained in backflow prevention, who serve(s) as the district customer contact for technical cross connection/backflow related issues.

Double Check Valve Assembly (DC): An assembly of two independently operating approved check valves with tightly closing resilient seated shutoff valves at each end of the assembly and properly located test cocks.

Hazard, Degree of: The term "degree of hazard" can be categorized as either a pollutant (non-health) hazard or a contaminant (health) hazard and is derived from the evaluation of conditions within a system.

Hazardous substance: A contaminant to the public water supply which can affect human health negatively or result the damage or destruction of company property.

Internal Protection: The appropriate type or method of backflow prevention within the consumer's potable water system at the point of use that is commensurate with the degree of hazard.

Non-residential customers: Refers to commercial, industrial, and public authority customers.

Pollution: An impairment of the quality of the water to a degree that does not create a hazard to the public health but does adversely and unreasonably affect the aesthetic qualities of such waters for domestic use.

Premises: Any and all areas on a water user's property which are served or have the potential to be served by the public water system.

Pressure Vacuum Breaker: An assembly consisting of a spring loaded check valve which closes tightly when the pressure in the assembly drops below one (1) psi or when zero flow occurs. The unit also contains an air relief valve that opens to break a siphon.

Primacy Agency: The State Agency(s) having authority or jurisdiction over cross connection control.

Public Water Supply or System: Any publicly or privately owned water system operated as a public utility under applicable local, State or Federal rules used to deliver potable water for domestic purposes.

Qualified Backflow Assembly Installer: The installer must be a plumber licensed by the applicable State and/or municipality, a plumber working under the direct supervision of a licensed plumber, or a qualified mechanical contractor, all of who meet all applicable local and State requirements to install backflow prevention assemblies.

Qualified Backflow Assembly Tester: The tester must have the appropriate backflow prevention assembly tester certification if required by the State or have appropriate training that is acceptable to the Water Company if there are no State certification requirements, and must follow all municipal, county, and State testing requirements.

Reduced Pressure Principle Backflow Prevention Assembly (RP): An assembly consisting of two independently operating approved check valves together with a hydraulically operating, mechanically independent, pressure differential relief valve located between the check valves and at the same time below the first check valve. The assembly shall include properly located test cocks for the testing of the check and relief valves and tightly closing resilient seated shut-off valves at each end of the assembly.

Residential Customer: Any single family home used solely for residential purposes. These include typical single family dwellings as well as duplexes, town homes, multi-family homes if independently metered, etc.

Residential Dual Check Valve (RDC): A backflow prevention device consisting of two spring-loaded, independently operating check valves in series within one housing. This is not an in-line testable device.

Service Connection: The point of connection of a user's piping to the public water supplier's facilities.

Water Company: American Water and its subsidiaries, who own or operate the approved water supply systems.

Water Customer: Any person obtaining water from a public water supply system owned or operated by the Water Company.

Appendix C: Summary of Policies Related to the Cross Connection Control Practice

Practice	Related Policy
Cross Connection Control Practice	Environmental Policy