



**COLORADO**

Department of Public  
Health & Environment

# Regulation 11.39 Backflow Prevention and Cross-connection Control Guidance



WATER QUALITY CONTROL DIVISION

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# TABLE OF CONTENTS

1. Introduction .....	4
1.1 Overview .....	4
1.2 Background .....	5
1.3 Purpose of this Guidance Document .....	5
2. Department Notification .....	6
2.1 Reportable Backflow Events .....	6
2.2 Reportable Regulatory Requirements .....	6
2.3 Public Notice Requirements .....	7
3. Backflow Prevention and Cross-connection Control Program .....	8
3.1 Legal Authority.....	8
3.2 Prohibition of Installing or Permitting Cross Connections .....	8
3.3 Identification of Cross Connections .....	9
3.4 Survey Process and Documentation .....	11
3.4.1 Single-Family-Residential Connections .....	12
3.4.2 Cross Connections Not Identified.....	12
3.5 Identified Cross Connections .....	12
3.6 Assembly and Method Selection.....	13
3.7 Tracking, Testing, and Maintenance .....	14
3.8 Certified Tester .....	15
4. Backflow Prevention and Cross-connection Control Annual Report .....	17
4.1 Calendar Year Backflow Prevention Assembly Testing and Reporting Guidance .....	19
5. Standards for Construction and Installation .....	20
5.1 Site-specific Deviation Criteria Development .....	20
APPENDIX A - BPCCC Program Template .....	21
APPENDIX B - Sample Ordinance .....	21
APPENDIX C - BPCCC 120-Day Cross-connection Control Extension.....	21
APPENDIX D - BPCCC Annual Report.....	21
APPENDIX E - BPCCC Survey and Questionnaires.....	22
E.1 Sample Cross Connection Identification Survey Form.....	23
E.2 Sample Cross Connection Identification Questionnaire and Letter to Consumer. ....	24
E.3 Sample Cross Connection Identification Survey for Water Supply Systems .....	27
E.4 Sample Cross Connection Identification Survey for Waterworks .....	29
APPENDIX F - Alternative Survey Compliance Ratio Application .....	31
APPENDIX G - Non-community Public Water System Program and Report Template.....	31
APPENDIX H - Example Assembly and Method Test Reports .....	32
APPENDIX I - Example Standards for Assemblies and Methods .....	34

# 1. Introduction

## 1.1 Overview

Colorado Revised Statutes 25-1-114 (1)(h) do not allow anyone to install, maintain or permit an uncontrolled cross connection that is connected to a drinking water system that supplies water to the public. The Colorado Primary Drinking Water Regulations, 5 CCR 1002-11 (Regulation 11), Section 11.39 requires that water suppliers that own and/or operate public water systems protect the drinking water from potential contamination through cross connections. Chemical, biological and radiological contaminants can pose unacceptable health and/or safety risks to the public through backflow of contaminants from cross connections. The Colorado Department of Public Health and Environment's Water Quality Control Division (Department) is responsible for ensuring that water suppliers comply with Section 11.39 of Regulation 11.

Generally, Section 11.39 of Regulation 11, the Backflow Prevention and Cross-Connection Control (BPCCC) Rule, requires that water suppliers do all of the following:

- Develop and implement a written BPCCC program;
- Notify the Department of any suspected or confirmed backflow events;
- Do not install cross connections at its facilities or throughout the distribution system;
- Do not allow any uncontrolled cross connections to continue to exist once discovered;
- Control the installation of new uncontrolled cross connections;
- Survey all non-single-family-residential connections for cross connections or control non-surveyed non-single-family-residential connections with the most protective backflow prevention assembly or backflow prevention method;
- Control any identified cross connection in a manner that prevents backflow through the cross connection in to the distribution system or if applicable the water supply system;
- Perform or verify annual backflow prevention assembly testing;
- Perform or verify annual backflow prevention method inspections; and,
- Keep records and develop an annual report to track compliance with the BPCCC Rule.

The Department reviews a public water system's backflow prevention and cross-connection control implementation procedures, methods, and records during sanitary surveys to determine whether or not the water supplier is compliant with Section 11.39. Inadequate protection, record keeping, reporting, operational, maintenance or other practices may be identified as a significant deficiency and/or violation that must be corrected for water suppliers to remain in compliance with Regulation 11.

The Department developed Safe Drinking Water [Policy 7 titled "Backflow Prevention and Cross-connection Control Rule Implementation Policy"](#) to provide additional information to assist water suppliers. The policy further explains how the Department evaluates whether a water supplier is meeting the performance requirements of the BPCCC Rule. Policy 7 specifically establishes and clarifies certain terminology used in the BPCCC Rule:

- Permitting an Uncontrolled Cross Connection;
- Ensuring that Activities are Completed - Implementing Legal Authority;
- Appropriate Assembly or Method for an Identified Contaminant;
- Unacceptable Health and/or Safety Risk;

- Site-specific Deviation Criteria;
- Most Protective Backflow Prevention Assembly or Method;
- Survey Process Documentation;
- Public Water System’s Water Supply System Cross Connections; and,
- Active Date.

## 1.2 Background

The Colorado Revised Statutes have required that water suppliers provide cross-connection control within their own water supply systems since the mid 1960’s. Regulation 11 has required that the cross connections be controlled since the mid 1980’s. Commercial and residential facilities are required to protect the potable water supply in accordance with the local jurisdictional plumbing code. If there is not a local code the *Colorado Plumbing Code* applies.

In 2015, the State of Colorado Water Quality Control Commission (WQCC) revised Section 11.37 and of Regulation 11 which became the Backflow Prevention and Cross-Connection Control Rule, located in Section 11.39 of Regulation 11, effective January 1, 2016.

## 1.3 Purpose of this Guidance Document

This guidance is designed to help water suppliers comply with the BPCCC Rule that the Department may evaluate at will and during sanitary surveys. Therefore, the purposes of this guidance document are to:

- Assist water suppliers in developing and implementing an adequate BPCCC program;
- Provide templates for BPCCC Rule requirements; and,
- Provide a common reference for water suppliers and Department staff.

This guidance document is not a regulation, is not a policy, and does not preclude other means for water suppliers to demonstrate that they comply with Regulation 11. However the methods described in this document are based on widely accepted industry standards, the *Colorado Plumbing Code*, EPA guidance and previously published Department guidance. This guidance addresses all water suppliers that operate regulated public water systems. When the term “must” is used in this document it means that the action is required by Regulation 11.

This guidance does not address the introduction of chronic contaminants or protection of storage tanks and the distribution system from contaminants that enter the system through various other means other than cross connections. Additionally, this guidance does not address unregulated treatment at private buildings or treatment for aesthetic concerns common to many plumbing arrangements found in Colorado.

This document will be updated as needed to include the most relevant and updated information available by the Department and the latest version can be found at <https://www.colorado.gov/pacific/cdphe/drinking-water-cross-connection-control-program>.

## 2. Department Notification

### 2.1 Reportable Backflow Events

All water systems experience conditions that could allow for the unintended reverse flow of fluids. This is known as a backflow event. Backflow through a cross connection can pose a risk to a public water system and its users. These risks may be acute and could cause an immediate health risk to the public. In the event that a backflow event contaminates the public water system the Department must be notified.

Regulation 11.39(3) requires that if a supplier learns of a suspected or confirmed backflow contamination event, the supplier must notify and consult with the Department on any appropriate corrective measures no later than 24 hours after learning of the backflow contamination event. The notification should be made to the **24-hour Environmental Release and Incident Report Hotline at 1-877-518-5608**. In the interest of public health, the Department encourages anyone aware of a backflow event, which may have contaminated a public water system through a cross connection, to call the Department as soon as possible after necessary emergency response calls have been made.

When reporting the event, please have available as much of the following information as possible:

- Date and time of event;
- Location of event;
- Type of threat or incident (bacteriological chemical, radiological, physical, etc.);
- Public Water System Name and Identification Number;
- Water supplier contact name and phone number;
- Method of discovery (consumer complaint, witness, perpetrator, employee report);
- Response actions taken (water quality parameter testing, isolation of affected water);
- Recovery actions taken;
- Notifications made (customers, law enforcement, news media, etc.);
- Assessment of threat, if possible.

Once the Department has gathered the necessary information the Department will provide assistance to ensure the safety of the public and the integrity of the public water system.

### 2.2 Reportable Regulatory Requirements

Regulation 11.39(7) requires that suppliers notify the Department within 48 hours after the water supplier becomes aware of any backflow prevention and cross-connection control violation or any backflow prevention and cross-connection control treatment technique violation specified in Regulation 11.39(6).

Such notifications to the Department can be written, verbal, or made by other means. The Department can be notified via telephone at 303.692.2000 and contacting the Department's Water Quality Control Division's backflow prevention and cross connection control specialist. The Department can also be notified via email at [cdphe.wqenginfo@state.co.us](mailto:cdphe.wqenginfo@state.co.us) sent to the attention of the backflow prevention and cross-connection control specialist.

### 2.3 Public Notice Requirements

Regulation 11.39(7) requires that suppliers distribute Tier 2 public notice as specified in Regulation 11.33 in any instance the supplier becomes aware of any backflow prevention and cross-connection control treatment technique violation.

Regulation 11.39(7) requires that suppliers distribute Tier 3 public notice as specified in Regulation 11.33 in any instance the supplier becomes aware of any backflow prevention and cross-connection control violation.

Please contact your Department assigned compliance officer with any questions regarding public notice. Department assigned contacts can be found online at; <https://www.colorado.gov/cdphe/dwcontact> .

### 3. Backflow Prevention and Cross-connection Control Program

Protection of public health from cross connections is best achieved through a properly developed, administered and implemented Backflow Prevention and Cross-connection Control program. The development of a written BPCCC program will be essential for compliance with Regulation 11. The written BPCCC program should clearly outline all procedures and duties associated with the implementation of the BPCCC program.

The BPCCC program will need to include and specify information regarding how the supplier identifies cross connections, performs surveys, and controls identified cross connections. The BPCCC program must also address how the supplier requires that backflow prevention assemblies and methods be tested and inspected annually, how the supplier will track the installation, maintenance, and testing of assemblies and methods and how the supplier will ensure that assemblies are tested by a *Certified Cross-Connection control Technician*, (Regulation 11.37(1)(b)). Many of these program components can be addressed through the establishment of legal authority.

[Appendix A](#) contains a link to the latest Department template for a written BPCCC Program. For suppliers that operate a non-community public water system, the Department has developed a simpler written program which includes the annual compliance report. The combined BPCCC non-community written program and report can be found in [Appendix G](#). Water suppliers should be prepared for a program review during each sanitary survey.

#### 3.1 Legal Authority

Generally, community public water systems administer three types of BPCCC programs. The most common forms of observed programs are based on one of the following: local government ordinances, user agreements or full public water system responsibility. An example ordinance can be found in [Appendix B](#).

Generally, non-community public water systems own their water supply system. When that is the case, the responsibility falls on the water supplier to control identified cross connections. If the supplier serves water to customers through a service connection the water supplier will have to implement a user agreement between the customers or take on full public water system responsibility to ensure that cross connections are controlled.

The supplier must have a legally-enforceable mechanism that implements its BPCCC program as described in Regulation 11.39(2). The Department recommends that the legally-enforceable mechanisms include specific provisions identifying customer requirements under 11.39(2)(a)(ii, iv) and the associated remedies that the water supplier may utilize for failure of customer(s) to comply.

#### 3.2 Prohibition of Installing or Permitting Cross Connections

Suppliers are prohibited from installing or permitting any uncontrolled cross connection to the distribution system or within the supplier's waterworks.

- Installing an uncontrolled cross connection means modifications or additions to waterworks or water supply systems that create a cross connection. The supplier is

prohibited from intentionally performing any actions which would result in the creation of a cross connection.

- Permitting an uncontrolled cross connection in the context of Regulation 11.39 means the supplier has allowed their users or customers to continue to have an uncontrolled cross connection past the regulatory-defined timelines. If the regulatory-defined timelines in Regulation 11.39 have elapsed and the supplier has not taken any of following actions; control the cross connection, remove the cross connection or suspends service to the identified connection\*\*\*, then the supplier is allowing, or permitting, the cross connection to exist and is in violation of Regulation 11.
  - \*\*\* Note. Before suspension of service can be considered appropriate action, the Department expects that the supplier will confirm the following:
    - The connection downstream of the valve used to suspend the service does not remain pressurized because the customer has access to an alternative source of water or a storage tank onsite
    - If the cross connection is to a fire suppression system; suspension of service would not result in the building being inadequately protected from loss of life through fire. If there are service connections at the property separate from the fire suppression system causing the cross connection, a supplier may suspend service to one or all of those other service lines (e.g. domestic or irrigation) as an appropriate action.
- The supplier may receive a Department approved alternative compliance schedule for identified cross connections that have not been controlled within 120 days. Department-approval of an alternative compliance schedule means either an email or other written communication from the Department. The Department has provided [APPENDIX C - BPCCC Rule 120-Day Cross-connection Control Extension Application](#) for such request.

### 3.3 Identification of Cross Connections

Suppliers must survey all non-single-family-residential connections to the public water system to determine if the connection is a cross connection. The supplier must also survey all connections within the supplier's waterworks to determine if there are any cross connections present which could contaminate the public water systems or the facilities water supply system. Acceptable survey process documentation should include how the supplier will select service connections that need a survey; For example:

Usage type - commercial, industrial, or multi-family;

New or newly acquired connections; and/or

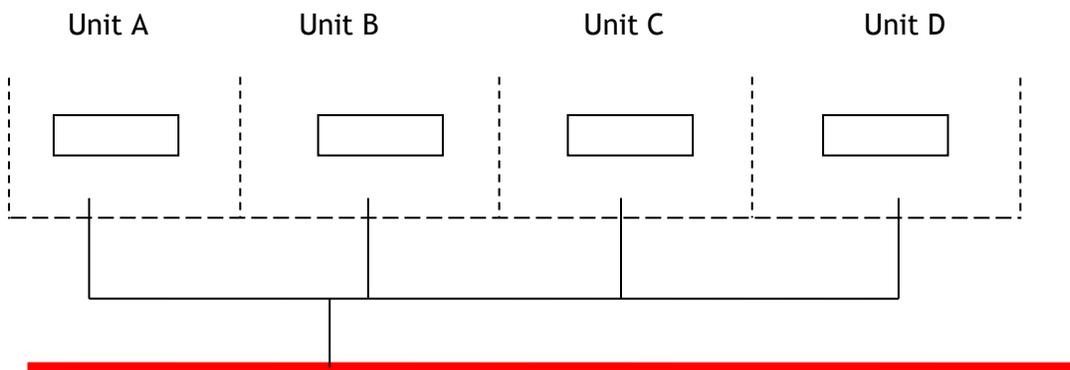
Questionnaire results.

The supplier must identify the total number of non-single-family-residential connections to the public water system and connections within the supplier's waterworks. This number is the total number or connections to the public water distribution system that are not considered single-family connections.

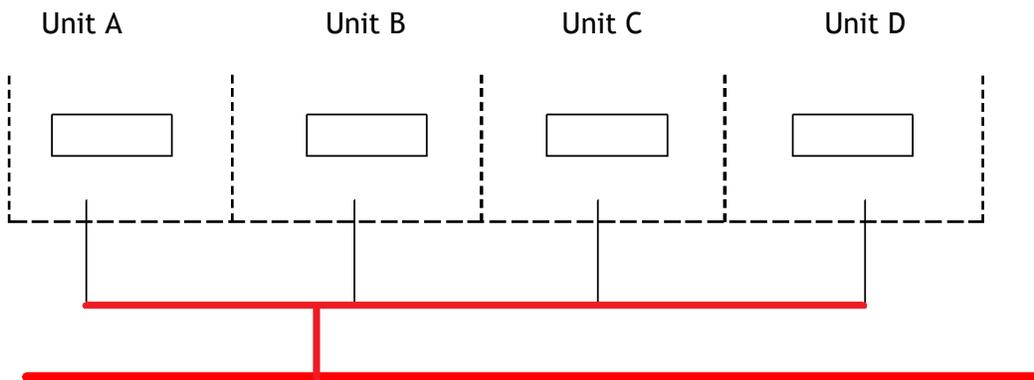
Single-family means:

- A single dwelling which is occupied by a single family and is supplied by a separate service line;
- A single dwelling comprised of multiple living units where each living unit is supplied by a separate service line.
- If a water supplier has ownership and maintenance responsibilities of a service line up to a point of single-connections such connections may be considered a single-family-residential-connection even if this connection is to a multi-family dwelling unit. It is important to be aware that all other applicable parts of Regulation 11 will also apply to those new acquired waterworks (i.e. distribution system) and that any irrigation or other cross connections that are directly connected to the newly acquired service line would have to be controlled in accordance with Regulation 11.39.

### Multi Family Connection



Scenario 1 - Example Multi-Family Connection to a Public Water System (distribution system is red thick line) considered a ***Non-Single-Family-Residential Connection***



Scenario 2 - Example Multi Family Connection with Four Separate Connection (Supplier assumes ownership and maintenance of the service line (distribution system is red thick line) up to the distribution system. This type of connection would be considered a single-family-residential connection.

### 3.4 Survey Process and Documentation

Once the supplier has identified the total number of non-single family residential connections, the supplier must survey the connections to identify cross connections. The supplier must document the process for conducting surveys. Surveys can be performed onsite by a person designated by public water system or can be a questionnaire type. The supplier's survey process should identify potential service connections and uses that when identified may trigger cross-connection control requirements. The supplier's process should address how the supplier will select individuals to perform the survey including experience and/or training or certification qualifications to perform a survey. Additionally the supplier must survey any waterworks and the water supply systems associated with those facilities for cross connections.

Should the supplier use questionnaires, various methods may be used to distribute the questionnaires: email surveys, web-based surveys, written surveys, or telephone surveys. Questionnaires should provide examples of common cross connections to the customer who completes the survey. Questionnaires should ask that the property-owner indicate the information provided is accurate to the best of their knowledge. If the supplier does not receive a response to a questionnaire or the results are inconclusive, the supplier is required to perform an onsite survey for cross connections or control the connection with the most protective backflow prevention assembly or method.

The Department has provided several example survey questionnaires to be considered by public water systems in [Appendix E](#).

The results of surveys should be kept in a manner that allows the supplier to demonstrate that a survey has been performed and if any action was required based on the result of the survey.

It is important that newly constructed and renovated buildings are constructed in accordance with the local plumbing code. The code is intended to protect the internal potable water system and its occupants from contamination that can be introduced via restrooms, kitchens, boilers, irrigation, HVAC systems, etc. It is equally important that the water supplier protect their distribution system from contamination that can be introduced via car washes, auxiliary water sources, fire suppression systems, irrigation and many other sources. Water suppliers need to perform cross connection identification surveys to identify potential cross connections within their distribution system.

Suppliers may choose not to perform surveys of non-single-family-residential connections if the supplier controls that connection with the most protective backflow prevention assembly or backflow prevention method. The following are acceptable "most protective backflow prevention assemblies or methods":

- Method - air gap installed in accordance with standard AMSE A112.1.2.
- Assembly - reduced pressure zone backflow prevention assembly.

### 3.4.1 Single-Family-Residential Connections

The supplier does not have to perform surveys at single-family-residential-service connections. If the supplier becomes aware of a single-family-residential connection to the public water system that is a cross connection, the supplier must control the cross connection in the same manner required in Regulation 11.

If the supplier's public water system consists only of single-family-residential-service connections, the public water system does not have to perform surveys at those service connections, however the supplier must survey its waterworks and identify if there are any direct connections to the public water system's distribution system such as irrigation systems, maintenance shops, fire suppression systems, agricultural uses, water fill stations or other hazards.

### 3.4.2 Cross Connections Not Identified

If the survey process identifies no cross connection the supplier must document the results of the surveys. The supplier is still required to have a written cross connection control program. The written BPCCC program should make mention of how the supplier will continue to evaluate new service connections and changes in use for potential cross connections.

## 3.5 Identified Cross Connections

Once a supplier has learned of a cross connection the supplier must take action based on the specific site conditions.

If the supplier learns of an identified cross connection and suspects or confirms that backflow contamination has occurred, the supplier must notify and consult with the Department on any appropriate corrective measures no later than 24 hours after learning of the backflow contamination event. Part 2.1 of this document provides guidance for reporting contamination events to the Department.

If the supplier believes that an identified cross connection could present an immediate health risk to the public based on the site's hydraulic conditions and the acute toxicity of the identified risk, the Department requests notification for further evaluation to determine if alternative action is necessary based on threat to public health. Such action could be an expedited schedule to remove the cross connection or the Department or supplier could issue a bottle water advisory for the impacted area.

If the supplier discovers an uncontrolled cross connection and believes that a backflow contamination event has not occurred, the supplier must: first the supplier must determine the type of backflow prevention assembly or backflow prevention method needed to control the cross connection and second install and maintain or require the customer to install and maintain a backflow prevention assembly or backflow prevention method at the uncontrolled cross connection, suspend service to the customer, or remove the cross connection, no later than 120 days after its discovery.

If the supplier becomes aware of a single-family-residential connection to the public water system that is a cross connection, the supplier must control the cross connection in the same manner required in Regulation 11.

If the supplier is unable to meet the 120-day deadline, the supplier must consult with the Department and the Department may approve an alternative schedule. The Department has created a 120 day deadline application for alternative compliance schedules, See [Appendix C](#). Submittal of the application does not constitute approval. If requested, the Department may send a confirmation of receipt of the application submission back to the supplier. Once the Department has reviewed the application the Department will notify the supplier of its decision.

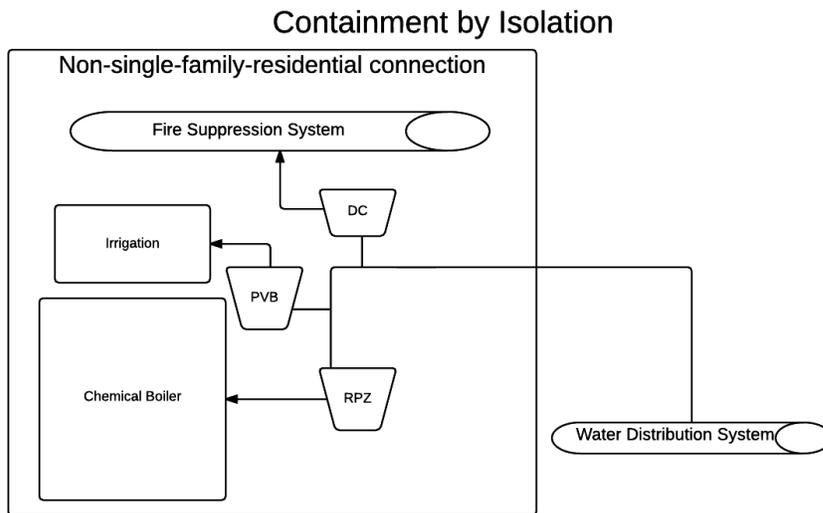
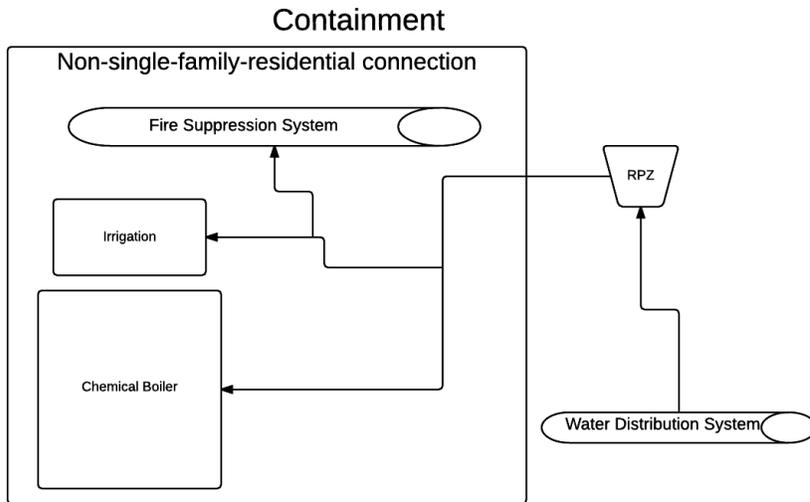
### 3.6 Assembly and Method Selection

Regulation 11.39(2)(2)(iii) requires that the supplier describe the process used to select a backflow prevention assembly or backflow prevention method to control a cross connection in the written BPCCC program. Suppliers should include in the written BPCCC program guidelines and criteria used to select the type of backflow prevention assembly or method used to control identified cross connection. Guidelines and criteria should address examples of cross connections throughout the water systems distribution system along with the corresponding appropriate backflow prevention assembly and or backflow prevention method used to control the identified cross connection. Part 4.3 of SDWP [Policy 7](#) provides various examples of backflow prevention assemblies and methods and when the use of such assemblies and methods may be appropriate.

Many water systems will choose to control all cross connections with the most protective backflow prevention assembly or method and will not have to develop guidelines or criteria. The rest of the water systems will need to identify the selected industry standards that are used to make control determinations. Regulation 11.39 allows suppliers the option to protect their public water system from cross connections by containment or containment by isolation.

“CONTAINMENT” means the installation of a backflow prevention assembly or a backflow prevention method at any connection to the public water system that supplies an auxiliary water system, location, facility, or area such that backflow from a cross connection into the public water system is prevented.

“CONTAINMENT BY ISOLATION” means the installation of backflow prevention assemblies or backflow prevention methods at all cross connections identified within a customer’s water system such that backflow from a cross connection into the public water system is prevented.



### 3.7 Tracking, Testing, and Maintenance

Suppliers must specify the process that the water system will use to require the installation, maintenance, testing, and inspection of all backflow prevention assemblies and backflow prevention methods used to control cross connections. Generally, this is specified in one of the following: local government ordinances, user agreements or the public water system assumes full responsibility. Suppliers must also specify the tracking mechanism it will use to verify the installation, maintenance, testing, and inspection of all backflow prevention assemblies and backflow prevention methods used to control cross connections.

In the state of Colorado, public water systems vary significantly in size and population served; ranging from a small restaurant that serves 25 people per day, to our largest water system which provides water to over one million people per day. Appropriate tracking mechanisms

will vary depending on the number of identified cross connections. If a water system performs a survey and no cross connections are identified then there will be no further tracking requirements, however the supplier's survey process will need to include an evaluation process which will capture potential changes in customers at surveyed service connections. New customers may create new cross connections which are required to be controlled. If the supplier identifies any cross connections that require control the supplier will have to develop and appropriate tracking mechanism for the installation, testing and maintenance of those assemblies and methods. Tracking methods may vary from a simple list, to a more complicated spreadsheet or tracking software specifically dedicated to control of cross connections. The Department has developed a sample tracking spreadsheet (as part of the annual report) that can be found in [Appendix D](#).

A good tracking mechanism will be able to keep track of the location of the cross connection (address and perhaps a description of the location of the assembly or method), facility contact and phone number, the cross connection type, the assembly or method used to control the cross connection, when available the initial discovered date, date assembly tested and result (pass/fail) for the preceding three year period, active date and any other notes that may be useful to the supplier such as installation issues or pass/fail history.

### 3.8 Certified Tester

Regulation 11 section 11.39(2)(a)(vi) refers to the “process the supplier will use to ensure backflow prevention assemblies are tested by a Certified Cross-Connection Control Technician”. The Department will determine the adequacy of a supplier's process to ensure that testing has been completed by a certified professional. Typically, the supplier is in compliance with section 11.39(2)(a)(vi) of Regulation 11 if the supplier does the following:

- i. The supplier has a documented process in place where the supplier receives a test report directly from the Certified Cross-Connection Control Technician or their associated company.
- ii. To be considered adequate, test reports used to document compliance with Regulation 11 must include all of the following:

Assembly or method information:

- a. Assembly or method type;
- b. Assembly or method location;
- c. Assembly make, model and serial number;
- d. Assembly size;
- e. Test date; and,
- f. Test result (pass/fail).

Certified Cross-Connection Control Technician information:

- a. Certified Cross-Connection Control Technician certification agency;
- b. Certification number;
- c. Certification expiration date or statement that certification is current; and,

- d. As an alternative to a-c, suppliers may provide documentation of an alternative validation process such as electronic login to reporting software where only current, certified cross-connection control technicians (or their companies) are given a login.
- iii. [APPENDIX H](#) provides examples of acceptable test reports.

#### 4. Backflow Prevention and Cross-connection Control Annual Report

In order to evaluate compliance with the backflow prevention and cross-connection control requirements of Regulation 11 and ensure protection of public health from cross connections suppliers must develop a written backflow prevention and cross-connection control annual report in accordance with Regulation 11. For each calendar year the written BPCCC annual report must be completed by May 1 of the following year. The first report must be completed by May 1, 2017. The report will need to be made available to the department upon request and will be evaluated during sanitary surveys for compliance. A backflow prevention and cross-connection report template can be found in [Appendix D](#). Also, for non-community systems, the combined BPCCC written program and report can be found in [Appendix G](#).

Per Regulation 11, the report must include the following information:

1. Total number of non-single-family-residential connections to the public water system and connections within the supplier’s waterworks. This is the number of connections that the supplier has identified which will either require a survey or protection. This number should be tabulated once and updated as needed. This number can only increase with new connections to the public water system’s distribution system and can only decrease if connections to the distribution system are reduced. **\*\*Note\*\*** The supplier is not required to include any non-single-family-residential connections identified after October 31 of the calendar year in the total number of non-single-family-residential connections to the public water system until the following calendar year.
2. Total number of connections surveyed to determine if cross connections are present. If a supplier chooses to control a connection with the most protective backflow prevention assembly or method for reporting purposes the connection can be considered surveyed and reported as such. This number is a tabulation of all connections surveyed and controlled throughout the years and not the number of connections surveyed that year.
3. Survey compliance ratio (SCR). SCR is equal to the total number of connections surveyed divided by the total number of non-single-family-residential connections identified. Note: If a water supplier determines that it may be difficult to achieve the survey compliance ratio, the supplier may propose an alternative survey compliance ratio to the Department- [Appendix F](#) contains the appropriate application form.

CPDWR Regulation 11 Table 11.39 -I Survey Compliance Ratio	
Compliance Date	Compliance Ratio
By December 31, 2016	Greater than 0.60
By December 31, 2017	Greater than 0.70
By December 31, 2018	Greater than 0.80
By December 31, 2019	Greater than 0.90
By December 31, 2020 and each year after	1.0

4. Total number of identified cross connections. If a supplier chooses to control a connection with the most protective backflow prevention assembly or method for reporting purposes the connection can be considered a cross connection and reported as such.
5. Number of uncontrolled cross connections identified during the calendar year.
  - a. Number of identified uncontrolled cross connections that were controlled within 120 days of discovery.
  - b. Number of identified uncontrolled cross connections that were not controlled within 120 days of discovery.
6. Number of backflow prevention assemblies installed at cross connections that were used during the calendar year. This is the number of assemblies installed that protected the public water system from potential contamination via cross connections for the previous calendar year.
7. Number of backflow prevention methods installed at cross connections that were used during the calendar year. This is the number of methods installed that protected the public water system from potential contamination via cross connections for the previous calendar year.
8. Number of connections where service was suspended as specified in 11.39(3) during the calendar year.
9. Number of backflow prevention assemblies used to control cross connections that were tested by a Certified Cross Connection Control Technician during the calendar year.
10. Backflow prevention assembly annual testing compliance ratio (ATR). The ATR is equal to the total number of assemblies tested during the previous calendar year divided by the total number of assemblies used to protect the distributions system during the previous calendar year.

CPDWR Regulation 11 Table 11.39 –II Backflow Prevention Annual Testing Survey Compliance Ratio	
Compliance Date	Compliance Ratio
By December 31, 2016	Greater than 0.50
By December 31, 2017	Greater than 0.60
By December 31, 2018	Greater than 0.70
By December 31, 2019	Greater than 0.80
By December 31, 2020 and each year after	Greater than 0.90

11. Beginning January 1, 2021, the number and location of backflow prevention assemblies not tested during the calendar year covered by the report.
12. Number of backflow prevention methods used to control cross connections that were inspected during the calendar year.
13. Backflow prevention method annual inspection compliance ratio.
14. Beginning January 1, 2017, the number and location of backflow prevention methods not inspected during the calendar year covered by the report.

## 4.1 Calendar Year Backflow Prevention Assembly Testing and Reporting

### Guidance:

The following is a list of scenarios that may present themselves to your water system and how those scenarios can be addressed;

**Scenario 1.** Assembly X was due to be annually tested in 2017. Assembly X was not tested in 2017. Consequently, assembly X was tested February 15, 2018. Assembly X is no longer required to be tested in 2018.

For the annual report due May 1, 2018, assembly X would not be included in the Regulation 11.39(4)(a)(ix) determination. Assembly X would be included in the Regulation 11.39(4)(a)(ix) determination for the annual report due May 1, 2019.

**Scenario 2.** Same scenario described above but occurred in 2020. Beginning January 1, 2021

Assembly Z was due to be annually tested in 2020. Assembly Z was not tested in 2020. Consequently, assembly Z was tested February 15, 2021. Assembly Z is no longer required to be tested in 2021.

For the annual report due May 1, 2021, assembly Z would not be included in the Regulation 11.39(4)(a)(ix) determination. Assembly Z would need to be included in the Regulation 11.39(4)(a)(xi) determination. Additionally, assembly Z would be included in the Regulation 11.39(4)(a)(ix) determination for the annual report due May 1, 2022.

## 5. Standards for Construction and Installation

Water suppliers are expected to develop methods or adopt standards in order to ensure that customers install the appropriate level of backflow prevention at service connections. Example standards are printed in [Appendix I](#). In cases where industry-accepted assemblies are not practical to be installed, site-specific deviation criteria may need to be developed.

### 5.1 Site-specific Deviation Criteria Development

The supplier may develop site-specific deviation criteria if the supplier determines that the installation of an alternative backflow prevention assembly or backflow prevention method is appropriate for the identified contaminant, or that a lower protective backflow prevention assembly or backflow prevention method can be installed due to more frequent testing and/or inspections.

If a supplier develops a site-specific deviation criteria, the supplier does not have to receive approval from the department. The department may be consulted when developing criteria. Site-specific deviation criteria and modifications are subject to review by the Department and may address situations where the assembly or method is installed in accordance with the local jurisdictional plumbing code or instances when the installation of an air gap or where the supplier considers that the RPZ retrofit would create an unreasonable burden.

If the department disagrees with an already implemented site-specific deviation criteria, it may be possible that the department would consider the cross connection uncontrolled. Depending on the severity of the situation, the cross connection may need to be controlled appropriately within 120 days or within ten days of being ordered by the department.

Examples of situations where site specific deviation criteria may be developed are provided in Part 4.5 of [SDWP Policy 7](#). The supplier must document and be able to provide the developed site-specific deviation criteria and make it available to the department upon request.

## **APPENDIX A - BPCCC Program Template**

An example BPCCC program can be downloaded on the Department's web page. The Department has provided a MS Word version of the required written program.

[Link to Department's BPCCC Page.](#)

[LINK FOR REV](#)

## **APPENDIX B - Sample Ordinance**

An example BPCCC ordinance can be downloaded on the Department's web page.

[Link to Department's BPCCC Page.](#)

[Link For Rev](#)

## **APPENDIX C - BPCCC 120-Day Cross-connection Control Extension**

A template for the BPCCC 120-day cross-connection control extension application can be downloaded on the Department's web page.

[Link to Department's BPCCC Page.](#)

[LINK FOR REV](#)

## **APPENDIX D - BPCCC Annual Report**

An example BPCCC annual compliance report can be downloaded on the Department's web page. The Department has provided a MS Word and Excel version of the required report, depending on system complexity.

[Link to Department's BPCCC Page.](#)

[Link for Rev \(MS Word\)](#)

[Link for Rev \(MS Excel\)](#)

## **APPENDIX E - BPCCC Survey and Questionnaires**

Water suppliers will have many options available to them to identify cross connections. Below you will find four types of questionnaires that can be used by customers or water system staff to perform cross connection identification surveys.

Section E.1 - The first document was based on a survey document provided by the City of Arvada and functions as a tool to allow supplier to document surveys performed in the distribution system.

Section E.2 - The second document functions has a sample written questionnaire and cover letter that suppliers may issue to consumers to identify cross connections at non-single-family service connections.

Section E.3 - The third document functions as a survey form for small systems which distributions system consist of onsite plumbing know as a water supply system.

Section E.4 - The fourth document functions as a survey form for waterworks facilities associated with drinking water production, storage and distribution.

## E.1 Sample Cross Connection Identification Survey Form.

Date: \_\_\_\_\_ Time: \_\_\_\_\_ Surveyor Name: \_\_\_\_\_

Site Name: \_\_\_\_\_

Site Address: \_\_\_\_\_

Site Contact: \_\_\_\_\_

Site Phone: \_\_\_\_\_ Alt Phone: \_\_\_\_\_ Cell Phone: \_\_\_\_\_

Type of Business: \_\_\_\_\_ Owner/Manager: \_\_\_\_\_

Mailing Address: \_\_\_\_\_ Contact: \_\_\_\_\_

Phone: \_\_\_\_\_ Alt Phone: \_\_\_\_\_ Cell Phone: \_\_\_\_\_

FAX: \_\_\_\_\_ E-Mail Address: \_\_\_\_\_

EXISTING CROSS CONNECTIONS Acct Number: \_\_\_\_\_

1. DOMESTIC Meter Number: \_\_\_\_\_ Size: \_\_\_\_\_

Location: \_\_\_\_\_

Protection: None / Type: \_\_\_ Make: \_\_\_\_\_ Model: \_\_\_\_\_ SN: \_\_\_\_\_

Description: \_\_\_\_\_

Comments: \_\_\_\_\_

2. FIRE SPRINKLER SYSTEM Size: \_\_\_\_\_

Location: \_\_\_\_\_

Protection: None / Type: \_\_\_ Make: \_\_\_\_\_ Model: \_\_\_\_\_ SN: \_\_\_\_\_

Description: \_\_\_\_\_

Comments: \_\_\_\_\_

3. LAWN SPRINKLER SYSTEM Isolation \_\_\_ Containment \_\_\_ Meter Number: \_\_\_\_\_

Size: \_\_\_\_\_ Location: \_\_\_\_\_

Protection: None / Type: \_\_\_ Make: \_\_\_\_\_ Model: \_\_\_\_\_ SN: \_\_\_\_\_

Comments: \_\_\_\_\_

4. PROCESS Description: \_\_\_\_\_ Size: \_\_\_\_\_

Location: \_\_\_\_\_ Protection: None / Type: \_\_\_

Make: \_\_\_\_\_ Model: \_\_\_\_\_ SN: \_\_\_\_\_

Comments: \_\_\_\_\_

5. PROCESS Description: \_\_\_\_\_

Size: \_\_\_\_\_ Location: \_\_\_\_\_ Protection: None

/ Type: \_\_\_ Make: \_\_\_\_\_ Model: \_\_\_\_\_ SN: \_\_\_\_\_

Comments: \_\_\_\_\_

6. PROCESS Description: \_\_\_\_\_

Size: \_\_\_\_\_ Location: \_\_\_\_\_ Protection: None

/ Type: \_\_\_ Make: \_\_\_\_\_ Model: \_\_\_\_\_ SN: \_\_\_\_\_

Comments: \_\_\_\_\_

## E.2 Sample Cross Connection Identification Questionnaire and Letter to Consumer.

Protecting You and Your Drinking Water System from Potential Contamination.

Did you know that your drinking water system is susceptible to contamination through water usage in your own building? This can happen when the drinking water system is connected to uses that make the water no longer potable. This is commonly referred to as a cross connection. Common cross connections found in a building are:

Fire Sprinkler Lines, Irrigation Sprinkler Lines, Boilers, Automatic Soap Injectors, Hoses in Sinks, Hose Bibs, Alternate Water Supplies, Swimming Pools, and Display Fountains.

Under certain conditions the unintended reverse flow of fluids can pass through a cross connection and could potentially contaminate the drinking water distribution system presenting an immediate health risk to you and potentially to your neighbors.

Cross connections within buildings cannot always be avoided but they can be controlled. Local jurisdictions require that private buildings be protected from contamination from cross connections in accordance with the local plumbing code. The Colorado Department of Public Health and Environment requires that public water systems control cross connections at all applicable service connections through various assemblies and methods. Cross connections are typically controlled via the use of air gaps, check valves and backflow prevention assemblies.

Under certain circumstances, a private residence may have a cross connection that is not covered under the local plumbing code. The Colorado Primary Drinking Water Regulation 11 requires that your water provider ensure that an adequate backflow prevention assembly is installed at the service connection or at the point where the cross connection is created. The attached questionnaire is intended to provide you with the opportunity to evaluate your building for potential cross connections and ensure that your drinking water system is being protected adequately from potential contamination. It is also intended to allow the water purveyor to identify any cross connections that are not covered under the local plumbing code.

Please note that the Colorado Revised Statutes 25-1-114 (1)(h) do not allow anyone to install, maintain or permit an uncontrolled cross connection that is connected to a drinking water system that supplies water to the public. Your building is connected to a water system that supplies water to the public.

Questionnaire for Cross Connection Identification Survey

Name on Account \_\_\_\_\_ Account Number \_\_\_\_\_

Account Address \_\_\_\_\_

1. Occupancy: \_\_\_\_\_ Own \_\_\_\_\_ Rent
2. Meter serves: Homes \_\_\_\_\_ How many? \_\_\_\_\_  
Buildings (garage, outbuildings, barns) \_\_\_\_\_ How many? \_\_\_\_\_
3. Do you have outside hose bibs at your building? \_\_\_\_\_ How many? \_\_\_\_\_
4. Do you have? (Please check all that apply):  
Underground Sprinkler System...\_\_\_\_\_ Swimming Pool...\_\_\_\_\_ Hot Tub...\_\_\_\_\_  
Drip/Soaker/Irrigation System...\_\_\_\_\_ Solar System.....\_\_\_\_\_ Jacuzzi...\_\_\_\_\_  
Darkroom Equipment.....\_\_\_\_\_ Fire Suppression System .....\_\_\_\_\_  
Portable Dialysis Machine.....\_\_\_\_\_ Auxiliary Water Source (well, etc.)...\_\_\_\_\_  
Ghost pipes (unidentified).....\_\_\_\_\_ Onsite Water Storage .....\_\_\_\_\_  
Insecticide Sprayers.....\_\_\_\_\_ Chemical Irrigation System .....\_\_\_\_\_  
Chemical Feed System.....\_\_\_\_\_ Boiler .....\_\_\_\_\_
5. Do you have a water softener, Reverse Osmosis or other treatment system?  
Yes\_\_\_\_\_ No\_\_\_\_\_
6. Do you have livestock and use a water trough?  
Yes\_\_\_\_\_ No\_\_\_\_\_
7. Do you have a booster pump, well pump, or any other type water pump?  
Yes\_\_\_\_\_ No\_\_\_\_\_
8. Do you receive irrigation water from a different source? \_\_\_\_\_ Yes\_\_\_\_\_ No\_\_\_\_\_
9. Do you have a backflow protection device on your property now? \_\_\_\_\_ Yes\_\_\_\_\_ No\_\_\_\_\_
10. Do you have any water-using equipment on not mentioned above?  
Yes\_\_\_\_\_ No\_\_\_\_\_

If yes, please list below:

\_\_\_\_\_

\_\_\_\_\_

If you checked any of the above in question four or answered yes to any questions, are you aware of potential backflow prevention measures being practiced onsite, such as an air gap, check valve or backflow prevention assembly? If so please explain and include the location of the identified backflow prevention measure:

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Print Name

Phone Number

By signing this document I acknowledge that to the best of my knowledge the information provided is as accurate as possible.

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Signature

Date

Please notify this office if any of the above conditions change.

### E.3 Sample Cross Connection Identification Survey for Water Supply Systems

Public Water system

Name \_\_\_\_\_

Name of Surveyor \_\_\_\_\_

Date of Survey \_\_\_\_\_

The public water system should complete the following document for each building that the supplier owns or maintains.

1. Do you have outside hose bibs at your buildings? How many?

\_\_\_\_\_

2. Do any of your buildings or facilities have? (Please check all that apply):

Underground Sprinkler System...\_\_\_\_\_ Swimming Pool...\_\_\_\_\_ Hot Tub...\_\_\_\_\_

Drip/Soaker/Irrigation System...\_\_\_\_\_ Solar System.....\_\_\_\_\_ Jacuzzi...\_\_\_\_\_

Darkroom Equipment.....\_\_\_\_\_ Fire Suppression System .....\_\_\_\_\_

Portable Dialysis Machine.....\_\_\_\_\_ Auxiliary Water Source (well, etc.)...\_\_\_\_\_

Ghost pipes (unidentified).....\_\_\_\_\_ Onsite Water Storage .....\_\_\_\_\_

Insecticide Sprayers.....\_\_\_\_\_ Chemical Irrigation System .....\_\_\_\_\_

Chemical Feed System.....\_\_\_\_\_ Boiler .....\_\_\_\_\_

3. Do you have a water softener, Reverse Osmosis or other treatment system at the point of use? Yes\_\_\_\_\_ No\_\_\_\_\_

4. Do you have livestock and use a water trough? Yes\_\_\_\_\_ No\_\_\_\_\_

5. Do you have a booster pump, well pump, or any other type water pump? Yes\_\_\_\_\_ No\_\_\_\_\_

6. Do you receive irrigation water from a different source? Yes\_\_\_\_\_ No\_\_\_\_\_

7. Do you have a backflow protection device on your property now? Yes\_\_\_\_\_ No\_\_\_\_\_

8. Do you have any water-using equipment on not mentioned above?  
Yes\_\_\_\_\_ No\_\_\_\_\_

If yes, please list below:

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If you checked any of the above in question 4 or answered yes to any questions, are you aware of potential backflow prevention measures being practiced onsite, such as an air gap, check valve or backflow prevention assembly. If so please explain and include the location of the identified backflow prevention measure:

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Any identified cross connections must be controlled in accordance with the Colorado Primary Drinking Water Regulation 11. The identified cross connection must be controlled within 120 days of discovery. If the cross connection cannot be controlled within 120 days the Department must be notified. Please note that the installation of assemblies or method within a buildings water supply may require the supplier to obtain plumbing permit from the jurisdiction having authority or the State of Colorado Plumbing Board.

## E.4 Sample Cross Connection Identification Survey for Waterworks

Public Water System

Name \_\_\_\_\_

Name of Surveyor \_\_\_\_\_

Date of Survey \_\_\_\_\_

The public water system should complete the following document for each waterworks facility that the supplier owns or maintains.

1. Do you have outside hose bibs at your buildings? How many?

\_\_\_\_\_

2. Do any of your buildings or facilities have? (Please circle all that apply and identify cross connection control assembly or method used for control):

Filter to waste line to waste collection system \_\_\_\_\_

Clean in Place Connection \_\_\_\_\_

Surface Wash \_\_\_\_\_

Subsurface Wash \_\_\_\_\_

Chemical Feed System \_\_\_\_\_

Irrigation Sprinkler \_\_\_\_\_

Non Potable Water \_\_\_\_\_

Water Loading Stations \_\_\_\_\_

Connections to waste collection systems \_\_\_\_\_,

Bypasses to treatment (Disinfection, coagulation and filtration must never be bypassed)

\_\_\_\_\_

Fire Suppression Systems \_\_\_\_\_

In-Plant Water Supply \_\_\_\_\_

Filtered or Finished Water \_\_\_\_\_

Well or alternative source \_\_\_\_\_

If you checked any of the above in question 2 or answered yes to any questions, are you aware of any uncontrolled cross connections. Please explain and include the location of the identified cross connection:

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Any identified cross connections must be controlled in accordance with the Colorado Primary Drinking Water Regulation 11. The identified cross connection must be controlled within 120 days of discovery. If the cross connection cannot be controlled within 120 days the Department must be notified. Please note that the installation of assemblies or method within a buildings water supply may require the supplier to obtain approval from the Department and must be done in accordance with the State of Colorado Design Criteria for Potable Water System. Please consult the Department when controlling identified cross connections.

## APPENDIX F - Alternative Survey Compliance Ratio Application

A template for the BPCCC alternative survey compliance ratio application can be downloaded on the Department's web page.

[Link to Department's BPCCC Page.](#)

[Link for Rev.](#)

## APPENDIX G - Non-community Public Water System Program and Report Template

Non-community public water systems and community water systems located on one entire property that contain water supply systems are subject to the following survey and cross connection control requirements:

- a. Generally, if the water supply system is owned by the supplier, then all cross connections within the water supply system must be protected from backflow. In this case, the water supply system is part of the distribution system for the purposes of identifying cross connections.
- b. The survey requirement in 11.39(3)(c) applies to the water supply system. At a minimum, identified cross connections must be controlled in accordance with the Colorado Plumbing Code. All backflow prevention assemblies and methods used to control cross connections must be tested or inspected and maintained as specified in Regulation 11.

A template for the BPCCC Non-community program and report can be downloaded on the Department's web page.

[Link to Department's BPCCC Page.](#)

[Link for REV](#)

## APPENDIX H: Example Assembly and Method Test Reports

### Sample Backflow Prevention Assembly Test Report

Public Water System:		
Customer Name & Number:		
Customer Account Number:		
Onsite Contact Person Name, Number & Address:		
Assembly Type and Size:		
Assembly Location:		
Assembly make model and serial number:		
Test Result:		
Certified Cross-Connection Control Technician Certification Agency		
Certification Number		
Certification Expiration Date		
Observations, Repairs or Comments		
Signatures of Owner or Onsite Contact:		
Date	Name	Signature
Signatures of Tester:		
Date Assembly Tested	Name	Signature

**Directions:** The tester or customer must submit and include all of the following information to the appropriate public water system. Record must be kept for three years.

## Sample Backflow Prevention Method Inspection Report

Public Water System:		
Customer Name & Number:		
Customer Account Number:		
Onsite Contact Person Name, Number & Address:		
Method Type and Size:		
Method Location:		
Device make model and serial number:		
Inspection Result:		
Certified Cross-Connection Control Technician Certification Agency (NA if performed by supplier staff)		
Certification Number (NA if performed by supplier staff)		
Certification Expiration Date (NA if performed by supplier staff)		
Observations, Repairs or Comments		
Signatures of Owner or Onsite Contact:		
Date	Name	Signature
Signatures of Inspector:		
Date Assembly Tested	Name	Signature

**Directions:** The tester or customer must submit and include all of the following information to the appropriate public water system. Record must be kept for three years.

## **APPENDIX I: Example Standards for Assemblies and Methods**

(1) Only the models of backflow prevention assemblies that are approved by the Foundation for Cross-Connection Control and Hydraulic Research of the University of Southern California (USC- FCCC&HR) or The American Society of Sanitary Engineering (ASSE) are acceptable for use when installing assemblies and devices used to control cross connections in accordance with Regulation 11.

(2) Air gaps must be installed in accordance with standard AMSE A112.1.2.

(3) Backflow prevention assemblies and air gaps used for containment shall be installed on the user's water service line as close as possible to the point of connection to the public water system and prior to any other connection or branch line. If it is not possible or practical to install backflow prevention assemblies or air gaps as described, the installation shall be at the approval of the water supplier; such backflow prevention assemblies or air gaps used for containment by isolation shall be installed in the user's plumbing system as close as possible to the cross-connections and shall be installed in accordance with the applicable plumbing code.

(4) No bypass piping shall be allowed around the backflow prevention assembly unless the bypass is equipped with the same degree of backflow prevention protection.

(5) Reduced pressure principle backflow prevention assemblies and reduced pressure principle detector backflow prevention assemblies shall be installed with no plug or additional piping affixed to the pressure differential relief valve port (except for specifically-designed funnel apparatus available from the manufacturer) and with the pressure differential relief valve port a minimum of twelve inches (12") above floor level or finished grade. Additionally, the assembly shall be installed at a location where any leakage from the pressure differential relief valve port will be noticed, that allows easy access to the assembly for maintenance and testing, and that will not subject the assembly to flooding.

(6) All double check valve assemblies and double check detector backflow prevention assemblies shall be installed at a location that allows easy access to the assembly for maintenance and testing and that will not subject the assembly to excessive heat or freezing.

(7) All pressure vacuum breaker assemblies and spill resistant pressure vacuum breaker assemblies shall be installed at a location that allows easy access to the assembly for maintenance and testing and that will not subject the assembly to backpressure or flooding. Said assembly shall be installed at least twelve inches (12") above the highest downstream plumbing.

(8) All backflow prevention assemblies installed on fire suppression systems shall be installed upstream of the fire department connection (FDC).

(9) All backflow prevention methods should be installed in accordance with the local jurisdictional plumbing code if applicable. If there is not a local jurisdiction having authority the method must be installed in accordance with the most current Colorado Plumbing Code.