

**CITY OF BOULDER
WATER RESOURCES ADVISORY BOARD
AGENDA ITEM**

MEETING DATE: November 18, 2013

AGENDA TITLE: Informational Item–Backflow Prevention Program Update

PRESENTERS:

Jeff Arthur, Director of Public Works for Utilities
Bret Linenfelser, Water Quality and Environmental Services Manager
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EXECUTIVE SUMMARY

As part of compliance with drinking water regulations, the City of Boulder (city) implements a program for cross-connection control, also known as backflow prevention, to prevent contamination to the city’s water distribution system. The Backflow Prevention Program includes tracking the installation and testing of cross-connection control devices (also known as backflow prevention assemblies) on customer water service lines to protect the city’s system from back pressure and back siphon events, as well as performing education and outreach and field inspections and investigations. In Boulder, backflow prevention assemblies are required on commercial facilities, fire lines, dedicated metered irrigation lines, but not residential households unless they have dedicated irrigation systems.

The city’s Backflow Prevention Program has been in place for many years, but in the past five years, staff has made significant changes in the program. This agenda item is intended to provide WRAB with an overview of the backflow prevention program. Staff is not requesting any formal action by the WRAB.

COMMUNITY SUSTAINABILITY ASSESSMENTS AND IMPACTS

Economic: Economic benefits of the program include minimizing impacts from contamination to the city’s distribution system. Customers, primarily commercial and industrial, that are required to comply have a cost for installation and annual testing of backflow prevention assemblies. All annual testing at non-city facilities is conducted by private certified testers.

Environmental: A backflow prevention program is required by Colorado Primary Drinking Water Regulations to protect human health.

Social: Reducing the potential for cross-connections within the city’s drinking water distribution system reduces the risk of water borne illness to the entire community.

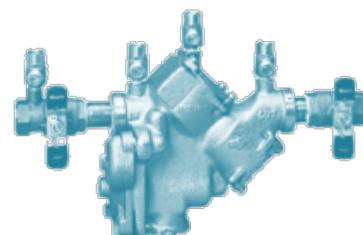
BACKGROUND

A cross-connection is a physical connection that could allow used water, industrial fluid, or water quality below the drinking water standards to flow from a plumbing fixture or a consumer’s water system *into* the city’s water distribution system. Backflow is the undesired reversal of flow, such as a back siphon or back pressure that could pull or push water from a connection into the city’s system.

Backflow prevention is accomplished through check valves within a backflow prevention assembly that closes when water begins to flow in the opposite direction from a customer connection. Changes in distribution system hydraulics, like pressure fluctuation or main breaks, can cause water from inside a property to pull back into a main service line. Conversely, internal pumps on a property could force water back into the water main. Both cases can be prevented through the installation of an approved (tested and functioning) backflow prevention assembly.

What is a Backflow Prevention Assembly?

A Backflow Prevention Assembly is a testable mechanical device that is placed on a customer’s plumbing which allows water to pass through the assembly in the direction of flow, but will not allow that water to flow back into the city water supply. These assemblies prevent “backflow”. When backflow occurs, water, bacteria or any chemicals in a customer’s internal plumbing threaten to contaminate the distribution system.



Regulatory Requirements

The Colorado Primary Drinking Water Regulations (CPDWR) require testing upon installation and on an annual basis to assure these assemblies are working (Article 12, CPDWR). The regulations require public water systems to identify potentially hazardous cross connections, require system users to install and maintain the containment assemblies, approve containment assemblies, and track the annual testing of the assemblies. After the Alamosa waterborne disease outbreak in 2008, the Colorado Department of Public Health and Environment (CDPHE) increased efforts to implement and enforce the details of the regulation. While regulation requiring backflow prevention has been in place since the 1960’s CDPHE has developed a more stringent backflow policy including:

- More stringent questions during a Sanitary Survey (a regulatory-based review of public water systems that occurs every 3 years)
- Specific program triggers that could result in CDPHE issuing a minor or major deficiency to the water system.

The city similarly increased compliance efforts in 2009 in keeping with state requirements and to better protect the city’s drinking water.

City Backflow Prevention Program

The city requires backflow prevention assemblies on commercial facilities, fire lines, dedicated metered irrigation lines, but not residential households unless they have dedicated irrigation systems or fire lines. Multi-family housing with more than eight units must also comply, because they typically have larger service lines and pose a greater public safety hazard. Backflow prevention may be required under other circumstances in which the city determines that the property represents a high hazard. For example residential customers with high hazards (such as well water). The city developed its backflow prevention ordinance in Chapter 11 of the Boulder Revised Code (section 11-1-25), as well as developed Design & Construction Standards (Chapter 5, Section 5.11).

Primary tasks of the Backflow Prevention Program include, but are not limited to:

- Identifying customers that must comply and contacting them by letter to remind them of annual testing requirements
- Determining hazards associated with different types of customer accounts
- Tracking all backflow prevention assembly testing. The city has incorporated the tracking with the city's utility billing database
- Working with customers and testers on determining compliance
- Working with the Planning & Development Services to ensure assemblies are installed and inspected
- Working with all city facility staff to maintain compliance
- Outreach and education

The city Backflow Prevention Program does not perform the installation and testing of assemblies on customer service lines. However, some city departments have certified staff for testing so they can perform testing on city facilities (e.g., Parks and Recreation). The city currently tracks approximately 4,200 accounts for backflow prevention. Over the past four years, staff has specifically increased compliance by reaching out to property managers, testers, and business and residential owners. The city's compliance rate has increased from 35% (2008) to 97% (2013).

Program improvements in recent years include:

Updating Contact Lists. Staff has put significant effort into gathering and updating contact information for testing companies, property managers, plumbers, etc. to assist customers with compliance. The increase in new backflow prevention assemblies installed in recent years indicates the communication has raised awareness and increased compliance (652 new devices were installed within the city in 2012 and 955 in 2011).

Documenting and Tracking Fire Lines. Staff has coordinated to create unique identification in the utility billing database to enable tracking and distinguishing fire from domestic lines and also fire lines with and without chemical (antifreeze). For known fire lines, differences in address identification by various city departments (e.g. Utility Billing, Fire Department, Planning) make known fire lines easier to cross-reference and verify if multiple fire lines

identified in the different databases are the same or if there are multiple fire lines at a given property.

Identifying Property Hazards. Staff has created Tier levels for potential hazard levels for each property. Tiers range from I (high) to III (low). By categorizing the degree of hazard potential, this helps prioritize accounts for compliance. This also helps when ownership changes and the past hazard ranking changes.

Identifying Backflow Prevention in Constituent Relationship Management System. Customers are able to direct questions or concerns for backflow prevention through this system.

Performing Education and Outreach. The city provides the following outreach to the general public and to specific customers (See Attachment A for example outreach material).

- **City of Boulder Website (Boulderwater.net/Backflow Prevention)** -We have received positive feedback from other utilities and customers on the education and information we offer on our backflow portion of the website.
- **Educational Billing Insert** - An annual billing insert to residential property owners provides information on backflow and installing and maintaining backflow devices on irrigation lines.
- **Backflow Protection Education Council (BPECC)** - The city has been on the board since 2008 and continues to educate through means of this council. We tackle current issues that should fall under the regulations for the State. We provide guidelines, pamphlets, and materials used in teaching backflow certification classes. We are also working on the latest version of the “Cross Connection Manual” for Colorado.
- **Operator Certification classes at Colorado Mountain College** - Teaching a backflow prevention class every year to students that are preparing for Operators Certification.

ANALYSIS

The city’s Backflow Prevention Program strives to be a model program in terms of improving compliance through tracking and efficiency in implementing the program. The city has the following ongoing projects and considerations.

Data Entry Automation. The Backflow Prevention Program is in the process of going virtually paperless through developing an online test report submittal, which will potentially save an approximate ¼ to ½ an FTE spent on manual data entry. Testers and customers currently submit reports to the city via email, fax, or mail. The change would save resources spent entering data and increase resource availability for program/department improvement.

Reverse Flow Meter Pilot. One of the issues with backflow events is that we don’t know if or how often they may occur. The city is working with Boulder Housing Partners by installing sub meters that record any reverse flow of water and record any leaks in the system. This pilot project will help identify occurrences that can be recorded at set intervals ranging from one

minute to one hour or more. This pilot is currently in place at a few locations with one of the city's HOA's.

Update Boulder Revised Code and Design & Construction Standards. Both the Revised Code (Chapter 11) and the Design and Construction Standards (Chapter 5, section 5.11) reference backflow prevention. Utilities is currently working with Planning & Development Services and the City Attorney's Office to improve the clarity and consistency of the rules, requirements, enforcement and terminology of the Backflow Prevention Program.

Enforcement Action Options. In lieu of shutting off customer's water service for noncompliance, other options for enforcement action have not been fully developed. The Backflow Prevention Program is reviewing (with City Attorney and Planning & Development Services) options for enforcement action to develop a standard approach and timetable for implementation. This includes reviewing when and if administrative penalties should be assessed for customers that are out of compliance. Currently, time and effort is committed to working with individual customers on compliance issues.

Regulatory Participation. CDPHE has been in the process of rewriting the cross connection requirements of the CPDWR (Article 12). City staff stays involved with backflow prevention discussions at the state level, proactively considers proposed regulatory changes and will participate in the stakeholder process, which is expected to begin in 2014.

The Reduction of Lead in Drinking Water Act will become effective on January 4, 2014, substantially reducing the allowable amount of lead in pipes, fittings and fixtures installed to deliver drinking water to consumers. Standards for maximum lead content of the wetted surfaces of plumbing products such as pipes, pipe fittings, plumbing fittings and fixtures will decrease from 8% to a weighted average of 0.25%.

The program has made significant strides in recent years in improving tracking and communication processes, program documentation, and compliance. Although the city's compliance rate is high, the program continues to address complexities with certain situations. For example, tracking all new and changed account types and ownership, backflow thefts, confirmation of non-visible assemblies in meter pits, and addressing site-specific situations that limit or add significant cost to implement backflow prevention. As an example, backflow prevention for the University of Colorado (CU) master meters would require significant cost for construction on vaults for sizable assemblies. CU proposed an alternative compliance through isolation devices within campus facilities (currently over 500 assemblies). City staff continues to work with customers, city legal staff, and the state in addressing these issues.

NEXT STEPS

- Pilot the online test report submittal process with testing companies – Late 2013.
- Participate in CDPHE stakeholder process to revise CPDWR – Beginning of 2014.
- Propose revisions to Boulder Revised Code and Design & Construction Standards - 2014.

ATTACHMENTS

A – Example Backflow Prevention Education Materials



Backflow Prevention, Irrigation & You

What Is Backflow & How Is My Irrigation System Involved?

Backflow is the undesired reversal of water flow, most often caused by pressure changes inside your home or in the pipes which deliver water to your home. **When backflow occurs, water inside your irrigation system can flow back into your drinking water.** Chemicals, bacteria or stagnant water can enter into your drinking water when garden hoses and irrigation systems are not properly protected. As a residential customer, you may not (generally) pose a risk to the drinking water supply, but you still need to make sure the water inside your home is safe for you and your family.



How Can I Protect My Drinking Water?

Just like conserving water is important, you also want to protect the water you have. Anytime you irrigate using a sprinkler system, a drip system, or even a garden hose, backflow prevention measures need to be taken. Here are a few ways you can protect yourself:

- **Sprinkler Irrigation Systems:** Aside from fertilizers, pesticides and fungicides, which can enter sprinkler lines, irrigation systems are also a home for bacteria. Whether from soil or animal waste (from your family pet), bacteria can enter sprinkler systems when water drains into sprinkler heads. Plumbing code usually requires that a Pressure Vacuum Breaker (PVB) be installed, but sometimes people install systems without PVBs or remove the PVB because it can leak. Having a functioning PVB is critical to protecting water.
- **Drip Irrigation Systems:** There are a number of drip irrigation systems ranging from true “drip” systems to soaker hoses. Although the pressure in these systems is reduced, there is still a potential for backflow to occur. Often a check device can be purchased in the sprinkler aisle of your local store, which can help prevent backflow. These checks can be installed on the drip system just after the connection to the spigot or hose bibb. Another option is to protect the entire hose bibb by installing a vacuum breaker on it.
- **Garden Hoses & Hose Bibbs:** Garden hoses are one of the most often reported sources of backflow. When garden hoses are connected to hose bibbs they often have no backflow prevention. When the opposite end of the garden hose is connected to hand-held fertilizers or left laying in a puddle of mud, backflow of contaminants is possible. Installing a vacuum breaker (as shown below) can help prevent backflow from occurring.



Always remember to winterize your irrigation system, including the maintenance and/ or removal of backflow prevention assemblies and devices.

For more information, please go to Boulderwater.net and look for Backflow Prevention under the Water Quality heading.

Spring Backflow Irrigation Checklist:



- Vacuum Breakers installed on hose bibbs
- PVB has been installed, tested & repaired
- Garden hoses are put away after use
- Drip systems have check valves

Winter Backflow Irrigation Checklist:



- Vacuum Breakers drained or removed
- PVB removed or protected from freezing
- Garden hoses removed from hose bibbs
- Drip system removed from hose bibbs

Backflow Prevention Assembly Requirements:

A quick guide for new installations and remodels



The information provided here provides a quick look at requirements and in no way alleviates the customer, contractor or plumber from reviewing plumbing code, manufacturer specifications, and/or other city requirements for backflow prevention assemblies, plumbing, etc. Please reference the [city of Boulder Design and Construction Standards - Chapter 5: Water Design](#).

Assembly requirement overview:

The assembly must be:

- 1) Installed after the meter and prior to any plumbing branches;
- 2) Installed according to manufacturer specifications;
- 3) Installed by a licensed plumber according to local plumbing code;
- 4) Installed without any pipes, hoses or valves that could bypass the assembly;
- 5) USC approved for the orientation in which it is installed;
- 6) Tested by a certified backflow tester in accordance with state regulation;
- 7) Tested upon installation and annually thereafter; and
- 8) Working properly such that a passing test report is sent to the backflow prevention program using the correct form within 10-days of the water service being turned on.

Assembly requirements by line type:

- **Fire Lines:** A testable backflow prevention assembly is required for fire sprinkler systems. Reduced Pressure Zone (RPZ) assemblies should be used. Double Check (DC) assemblies may be used in certain cases as allowed by the program and/or Fire Department. If there is chemical injection, a RPZ is **always required**. Reduced Pressure assemblies will need appropriately sized drains.
- **Dedicated Irrigation Lines:** A testable backflow prevention assembly is required for irrigation service lines. Reduced Pressure Zone (RPZ) assemblies should be used. Pressure Vacuum Breaker (PVB) assemblies may be used in certain cases (where there is no backpressure), as allowed by the program. If there is chemical injection, a RPZ is **always required**. RPZ assemblies will need appropriately sized drains.
- **Domestic Service Lines:** A testable backflow prevention assembly is required for domestic water service lines. Reduced Pressure Zone (RPZ) assemblies should be used. Double Check (DC) assemblies may be used in certain cases, as allowed by the program. If there is chemical injection, a RPZ is **always required**. RPZ assemblies will need appropriately sized drains.

Examples of large and small backflow prevention assemblies (Pictures Courtesy of Watts Regulator Company)

DC



RPZ



PVB



For more information about the Backflow Prevention Program, visit www.boulderwater.net and click on "Backflow Prevention Program."