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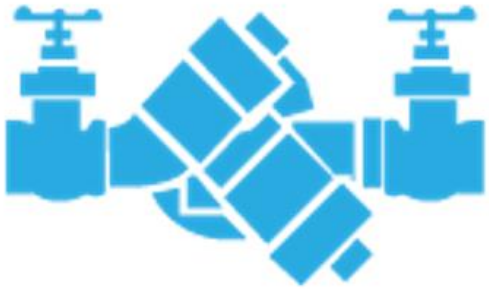

8 STEPS

TO IMPLEMENTING YOUR BACKFLOW MANAGEMENT PROGRAM

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8 Steps to Implementing a Backflow Program?

Does your Water Utility currently have a backflow management program? In other words, are you tracking the testing of all your backflow devices on a yearly basis? If you do not have a program, or the one that is in place currently is not very consistent, this article will explain how to implement a brand-new backflow program, or dramatically improve an existing one.

It is crucial that all Water Utilities have and maintain a backflow management program in order to ensure the quality and safety of drinking water. What is a backflow management program exactly? It starts with identifying and locating all properties within a Water Utility that has the potential to introduce contaminants or pollutants into the drinking water system through . This will be discussed in more detail in this article, but a survey of each property would identify the ones that require a backflow prevention device. Once those locations are determined, a backflow prevention device is installed, it then must be tested at least annually, by a certified tester, to ensure it is working properly. All of those tests must be archived and submitted to your department of health, Department of Environmental Protection, or another regulatory agency depending on the requirements of your state and county.

If you are starting this from scratch, it can be a very overwhelming process, but it is an absolute necessity. VEPO CrossConnex is here to help. We assist utilities in developing a plan depending on the current status, or lack thereof with their current backflow management program. Below is a list of 10 steps you need to take in order to implement a backflow management program. You can also CONTACT US for a consultation on how we can help you start from scratch or improve your existing system.

STEP 1

1. **Education**
   Start to educate yourself, and your team, on the potential dangers of a sub-par backflow management program or not having one at all. Contact your local regulatory agency to find out what their requirements are. You may have some hesitancy in performing this task because your utility has been flying under the radar in the past. Or, your regulatory agency might not have much information to offer you either. Unfortunately, I have found some counties, or even states, that have not taken backflow prevention as seriously as they should. Regardless of your situation or your relationship with those agencies, I have always found that taking a pro-active stance to show them you are making efforts to do the right things by your customers is much more acceptable than doing nothing.

STEP 2

2. **Educate Management Team**

   Every Water Utility or Water Purveyor has a different type of management team that they must report to. You may have a town Supervisor, City Manager, Mayor, Superintendent, Town Board, City Council, Board of directors, etc. In order to get your backflow management program accepted and implemented, your management team is going to have to understand what a backflow management program is, why you need a program or improvements to your existing program, and how you plan to maintain and manage your program going forward. The management team does not need to understand the nitty gritty details and I am sure you are very familiar with the information they will need to approve you and your team moving forward with implementing a backflow management program.

   I would recommend reading the rest of this document to be sure you understand all the steps you will need to take when starting a backflow management program. Then you will be better prepared if your management team does start to ask you some more pointed questions. But it is crucial that your management team understands what is at risk if they don't allow you to implement a proper backflow management program. If you have a program in place but you know it is lacking in some ways, they need to understand that as well! We have posted many articles about backflow incidents where properties were not appropriately protected from backflow including chemical plant causes burns in Alabama or you can also refer them to Lack of backflow allows lethal pesticide to contaminate water. Explain to your management team that you are devising a plan to ensure the safety and quality of your Water Utility's drinking water. Implore your management team to allow you the resources you need to implement your plan so that you don't become one of those Water Utilities that suffered from the lack of a proper backflow management program. This article will provide you the detailed steps you will take and that you can present to your management team.

STEP 3

3. **Ordinance**

   Now that your management team is on board with you moving forward in creating a detailed plan to implement a backflow management program, do you have any ordinance in place currently that gives you the ability to require your customers to install a backflow prevention device based on the type of facility they are, equipment they utilize, or situations that exist on their property? You will want that ordinance to describe how often your customers with backflow prevention devices must have them

tested. Each device should be tested annually but could be done more frequently depending on the level of contaminant on their property.

Under the provisions of the Safe Drinking Water Act of 1974, the Federal Government established, through the EPA (Environmental Protection Agency), national standards of safe drinking water. Now the states are responsible for the enforcement of the Safe Drinking Water Act (SDWA) standards and they have to hold the public water supply systems responsible for any violations of those standards. But the Water Utility is responsible to comply with the SDWA standards and ensure that the water distributed to their customers conforms to the EPA requirements. The Water Utility also has to guarantee that the water quality will not be affected during the delivery of the water to customers. One major step in making sure the water quality meets the EPA standards is to make sure contaminants and pollutants are not introduced into the water through the use of backflow prevention devices.

Therefore, Water Utilities need to adopt a backflow control ordinance at the local level and have it approved by the water commissioners, town board, city council, etc. It then needs to be adopted by the Water Utility as legal enforceable document. Below is some language from a City in Upstate New York as an example.

A.

All service lines from the City's water supply system shall be protected from backflow of water by means of a backflow-prevention device to prevent contamination from the premises into the City's water supply system. The Superintendent shall establish specifications for backflow-prevention devices, and no device shall be installed without the Superintendent's permission.

B.

Each service line to a facility shall be protected in a manner commensurate with the degree of hazard of the facility. The degree of hazard and type of backflow-prevention device to be used to achieve containment shall be based on use of the facility and availability of containments.

C.

The Superintendent shall determine the type of backflow-prevention device to be installed based upon the determination of the degree of actual or potential hazard.

D.

All reduced-pressure-zone devices (RPZ) and double-check-valve assemblies (DCV) must be on the current listing of acceptable devices issued by New York State Department of Health. The design of all backflow-prevention-device installations shall be approved by the New York State Department of Health or XXXXX County Department of Health.

E.

All backflow-prevention devices shall be subject to approval by the Superintendent.

F.

Backflow-prevention devices shall be required as indicated for the following types of uses:

Degree of Hazard	Type of Facility (illustrative only)	Type of Protection (minimum requirement)
Hazardous	Industrial plants, metal-plating industries, hospitals, nursing homes, medical buildings, sanitariums, laboratories, veterinary facilities	Acceptable air gap or reduced-pressure-zone device (RPZ)

G.

No cross-connections are permitted between a supplementary water supply and the City's water supply.

STEP 4

4. **Priority System** – It is important to determine the types of contaminants or pollutants each property in your system may have. It is important to establish a priority system because it will most likely take time to install all the required backflow prevention devices required, and you want to be sure to protect the system from the most dangerous contaminants first. The differences between contaminants and pollutants is significant.

CONTAMINENTS – According to the USEPA, a contaminant is “A substance that will impair the quality of the water to a degree that it creates a serious health hazard to the public leading to poisoning or the spread of disease.” A contaminant, outside of sewage

or nuclear waste, is the worst type of substance that can enter the water system. Types of backflow devices used for contaminants will be discussed later in this article.

Examples of some contaminants include:

- Nitrogen
- Bleach
- Metals
- Human or animal drugs
- Viruses
- Salts
- Pesticides
- Toxins produced by bacteria
- Parasites
- Protozoan

POLLUTANTS – According to the USEPA, a pollutant is "A foreign substance, that if permitted to get into the public water system, will degrade its quality so as to constitute a moderate hazard, or impair the usefulness or quality of the water to a degree which does not create and actual hazard to the public health but which does adversely and unreasonably effect such water for domestic use." In other words, a pollutant is something that is going to affect the color, smell, or looks of the water. But if you were to consume a pollutant, it wouldn't affect your health. As a Water Utility, pollutants clearly need to be contained. You don't want your customers receiving dirty or smelly water. That will then start to put questions in their minds as to the quality of the water and whether it is really safe for them to consume.

Examples of some Pollutants include:

- calcium
- Aluminum
- Manganese
- Sodium and Chloride
- Iron
- Arsenic

ESTABLISHING YOUR PRIORITIES

PRIORITY 1:

Nuclear/Sewage Facilities

Nuclear and Sewage facilities are clearly the most dangerous facilities a Water Utility need to contain within their service territory. Most Water Utilities will not have a threat of nuclear contamination but a majority of Water Utilities will have a sewage or water treatment facility they will have to protect against. If you have either of these types of facilities in your Water Utility and they are not currently protected, please stop reading

this now and get to work immediately on getting the proper backflow prevention devices at those facilities now!!

PRIORITY 2:

Hazardous Facilities

Determine where your hazardous facilities are. These are locations that could potentially introduce very harmful contaminants to the drinking water. They need to be protected with a Reduced Pressure Zone (RPZ) device. We will discuss the different kinds of backflow prevention devices later in this article. Below is a list of example facilities that you might want to look for in your Water Utility that might fall into this category.

Type of Facility

- Sewage & industrial wastewater treatment plants, pumping stations, sewer flushers
- Paper manufacturing or processing, dye plants, petroleum processing, printing plants, chemical manufacturing or processing, industrial fluid systems, steam generation, rubber processing, tanneries
- Canneries, breweries, food processing, milk processing, ice manufacturing, meat packers, poultry processing, rendering companies
- Hospitals, clinics, laboratories, veterinary hospitals, mortuaries, embalmers
- Shipyards, marinas
- Metal-plating, photo-processing, laundries, commercial car washes, commercial refrigeration systems, dry cleaning
- Commercial greenhouses, spraying & irrigation systems using weedicides, herbicides, exterminators
- Boiler systems, cooling towers or internal fire-protection systems, corrosion control chemicals
- Some Water Utilities require backflow prevention devices at residential properties that contain a pool or an irrigation system. I agree with this method of thinking. A pool can introduce an exorbitant amount of chlorine into a drinking water system.

  Some of you reading this might be thinking that putting a backflow device at every pool and irrigation system might be overkill. There have been many instances when a resident has filled their pool with a garden hose and left it in the pool. If an instant of back-siphonage occurs, caused by many different situations including a main break, then the water from the pool can be sucked backwards through the garden hose and into the drinking water system. There are documented cases of people getting sick from drinking pool water that had

backflowed into the main distribution system. Protecting backflow from occurring on irrigation systems is even more obvious to me. People use all kinds of pesticides, fertilization chemicals, and weed killers on their grass that can easily be drawn back into the drinking water system and affect the health of Water Utility customers.

PRIORITY 3:

Aesthetically Objectionable Facilities

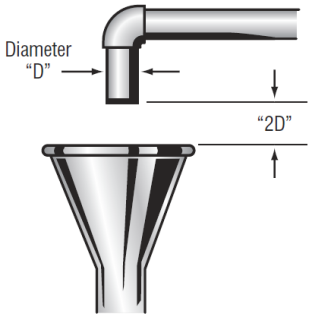
These are facilities that might introduce something to the drinking water causing a change in the look, taste, smell, or color of the drinking water. It is unlikely that these facilities are going to cause health related issues for people within your Water Utility. However, it is crucial they have backflow devices so that the quality of your water is not affected. Some examples of facilities that might fall into these categories include:

- Customer fire protection loops, fire storage tanks (with no chemical additives) – These types of facilities may contain stagnant water that can be back-siphoned into the drinking water affecting the color, taste, or odor.
- High temperature potable water
- Utilization of food grade dyes – this can obviously change the color of the water
- Complex plumbing systems in commercial buildings included but not limited to: barber shops, beauty salons, churches, apartment buildings, gas stations, supermarkets, nursing homes, construction sites, and carnivals. – These types of facilities could contain a large amount of plumbing errors, obsolete plumbing equipment, poor plumbing inspection/correction programs. That is why it is necessary for water purveyors to require surveys be completed on all non-residential properties at a minimum of every 5 years.

STEP 5

5. **Determine the type of devices required and cost to customers**
   There are various types of backflow devices that all provide different functionality to protect against different types of contaminants and pollutants. Lets describe each type of device and the applications they should be used in.

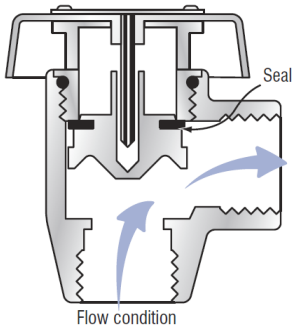
   a. AIR GAP



These devices are non-mechanical backflow preventers that are very effective for backsiphonage or backpressure conditions that could possibly exist. As you can see from the diagram above, the air gap needs to be a distance of 2 pipe diameters from the device it is feeding water to from the drinking water service. Air gaps can be complicated and expensive because they typically require added reservoirs, pumping, and additional plumbing work. However, it is sometimes a requirement depending on the contaminant it is protecting from the drinking water supply. Air gaps must also still be inspected regularly to ensure that the approved setup of the air gap remains in place.

Applications: Air gaps are necessary to use when nuclear waste, sewage, or lethal health hazards are present. They are effective in protecting against back-siphonage and back pressure. These devices will contain pollutants and contaminants guaranteeing they do not enter the drinking water system.

b. ATMOSPHERIC VACUUM BREAKER (AVB)

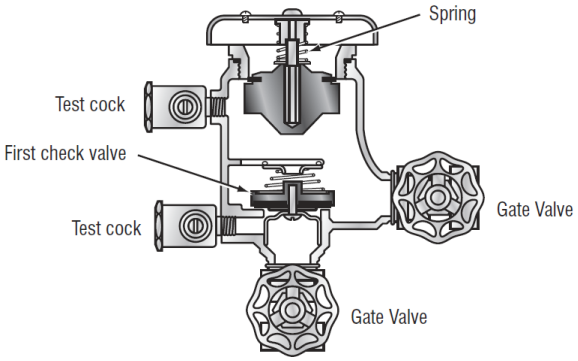


These devices are among the simplest and cheapest devices available. However, they only work against back-siphonage and not back pressure. Therefore, they are only good in certain applications like hose bibs or irrigation systems which are the most popular applications. If these devices are used, they are not able to be tested in line, so they will most likely have to be replaced at a consistent time frame. Refer to the manufacturer of the device to determine the appropriate time line in which devices should be replaced. For the most part they are very reliable devices utilized

to prevent back-siphonage but are not effective for applications where back pressure is present.

Applications: AVBs can be used in locations where health hazards are present including pollutants and contaminants but NOT where a possibility of back pressure is present. Some examples include residential hose bibs, irrigation systems, sinks, household appliances, etc. AVBs are typically available in sizes 1/2" to 3".

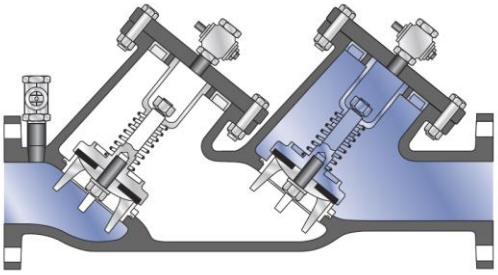
c. PRESSURE VACUUM BREAKERS (PVB)



These devices are basically an extension of the Atmospheric Vacuum Breaker but allow for inline testing and some larger size applications. Again, these devices are NOT to be used where back pressure could potentially exist, they are only good for back-siphonage situations. They have two test cocks and two gate valves which allows for the inline testing of the device. The addition of a spring in the float allow for these devices to operate under constant pressure. PVBs are very reliable devices as well but should be tested annually unless other recommendations are made by the manufacturer of the device.

Applications: PVBs are often used in agricultural and irrigation applications and are available in sizes ranging from ½" to 20". Because these devices are designed to operate under constant pressure, the must be installed 6 to 12 inches above the final outlet of the plumbing it is attached to.

d. DOUBLE CHECK VALVE (DCV)

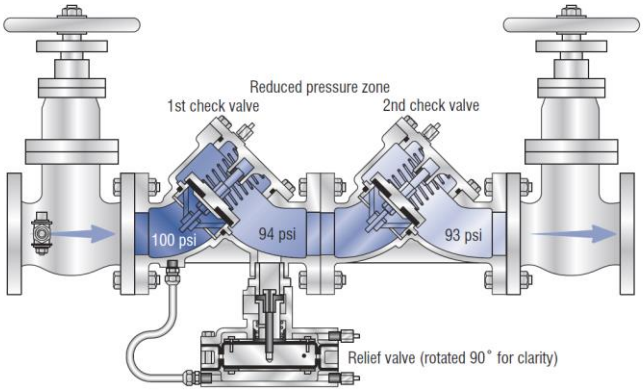


These devices are basically the combination of two single check valves that can be tested in line. Each check valve is spring loaded which allows these devices to be effective in protecting against back-siphonage and back pressure conditions. Each check valve can be tested separately to determine if both of them are still working properly. They must be tested annually at a minimum. There are also some slightly different versions of this device like the double check detector check. These devices are more appropriate for locations that have some form of fire protection built into the building. These devices protect against stagnant water, chemical substances added to the fire protection system, or the addition of raw water through outside fire pumper connections like the Siamese connections on the outer walls of buildings.

There are also residential dual check valves that are less expensive than a double check valve and can protect against home photo chemicals, herbicides, pesticides, and any other chemicals a home might introduce to the drinking water system.

Applications: DCVs are very common devices that are useful in locations that contain low to medium threats or pollutants such as restaurants, apartment buildings, Schools, and other commercial properties that do not contain substances that are health hazards. However, I do not recommend that a DCV be used in any situation where substances considered to be a contaminant or health threat.

e. REDUCED PRESSURE ZONE (RPZ)



These devices are very commonly used and the most effective device at protecting against any kind of backflow. Back-siphonage and backpressure are no match for these devices due to the design which includes two check valves, an atmospheric vent between the two check valves, and two test cocks for testing the device while in line. These devices can operate under constant pressure and can be utilized at locations that contain high health hazard substances. If you are ever in doubt as to what device to use, an RPZ takes care of all potential issues. Although air gaps, when properly designed and implemented, are the most effective and protecting against backflow, they are sometimes too expensive or impossible to use due to plumbing limitations. An RPZ may be your best solution.

Applications: RPZs are typically used in a wide range of plumbing and water works applications. They can be utilized in any situation that may contain highly hazardous chemicals, pollutants, back-siphonage, or back pressure. They rand in size from ½" to 10" and is the device to use if you are unsure of what device to install at a particular application.

<u>NOW WHAT???</u>

Now that you understand the different types of devices that exist and what applications to use them in, it is time to go through a survey process to determine what device should be installed at each individual location.

STEP 6

6. **Survey Process** - Even if you do have some kind of a backflow management program in place, it is highly recommended that you complete a survey process at least once every 5 years to determine if property requirements have changed or if the backflow devices

currently in place are the correct pieces of technology to be used. Before starting the surveying process, you need to determine if you are only going to require a backflow device at the point of service or if one will be required at every cross-connection location. This process should be completed either by the water purveyor, an engineering firm, or a 3rd party company qualified to perform this work.

Existing backflow devices should be inspected to make sure they are correctly installed, and the right type of device was used. The inspectors should be looking at the property to ensure there are not any new cross connections the customer has created without notifying the water utility.

a. Identify properties that have a high health hazard potential.
b. Once this list is created, a schedule should be created to ensure the program moves forward at an appropriate pace.
c. An Appointment should be made with every one of these properties to have an inspection of their plumbing systems completed.
d. Inspector visits the property to complete the required survey
e. All information collected should be compared with existing records and confirm the appropriate devices are installed at the property.
f. If changes are required, the property owner needs to be informed of what they are responsible for.
g. The water purveyor shall then create a list of lower priority locations and repeat the previous steps.

Below is an example of a survey form that can be used during the survey process.

Cross-Connection Survey Form

Date: _____

Name of Company, Corporation, or Business: _____

_____

Address: _____

Name of Contact: _____

Type of Use: Industrial _____ Commercial _____ Governmental _____ Other

Location of Service: _____

Size of Service: _____ Inch	Metered?	Yes ☐	No ☐
Require non-interrupted water service?		Yes ☐	No ☐
Does Boiler Feed utilize chemical additives?		Yes ☐	No ☐
Is Backflow protection incorporated?		Yes ☐	No ☐
Are air conditioning cooling towers utilized?		Yes ☐	No ☐
Is Backflow protection incorporated?		Yes ☐	No ☐
Is a Water Saver utilized on condensing lines or cooling towers?	N/A ☐	Yes ☐	No ☐
Is the make-up supply line backflow protected?		Yes ☐	No ☐
Is process water in use, and if so, is it potable supply water or "Raw" water		N/A ☐	Potable ☐
	Raw ☐	Protected ☐	Unprotected ☐
Is fire protection water separate from the potable supply?		Yes ☐	No ☐
Are Containment Devices in place?		Yes ☐	No ☐

Summary

Degree of Hazard:		High ☐	Low ☐
Type of Device recommended for containment:	RPZ ☐	DCV ☐	None ☐
Fixture Outlet protection required?		Yes ☐	No ☐

If so, where?

_____

STEP 7

7. **Public Relations** – Now you have established an ordinance, a priority system, understand what types of devices should be utilized in certain applications, and created a survey process. Whether you are implementing a brand-new backflow management program, or updating an existing one, it will be important to launch a public relations campaign to educate your customers. Once you have determined the locations that need devices, or locations that have not been tested for long periods of time, it will be necessary to let customers know the steps they need to take in order to be in compliance with state, county, and local laws/ordinances.

   The purpose of a backflow management program is ultimately to protect your customers' drinking water. Your customers will most likely view your program as "just more money out of their pocket", and your program will not be met with open arms. If you take the time to educate your customers through letters, website information, public addresses, etc… you are much more likely to have success with your program. People need to understand the potential dangers caused by the lack of protection from potential contaminants or pollutants being released into the system. Customers also need to understand that they are responsible for protecting the water system from contamination from their facility. Everyone must do their part, but they need guidance and education on what exactly their responsibility is. Contact VEPO CrossConnex for help with developing a proper PR campaign.

   You will need to start with a general education program notifying people of the importance of a backflow management program. When your customers understand the potential consequences of not properly installing and maintaining their backflow devices, they are much more likely to take the necessary precautions to make sure it is done correctly. Then you will need to contact the customers affected by the results found during the survey process to notify them of their immediate responsibilities and their long-term maintenance responsibilities discussed in the following steps.

STEP 8

8. **Testing Program** – Once you have a backflow management program in place, or you are still in the process of improving your existing one, it is crucial that you require annual testing at a minimum. If your devices are not tested on a consistent basis, then you run the same risks as if you didn't ever require the installation of backflow devices in the first place. The testing process is quite simple and can be done one of two ways.

   Some water purveyors provide the testing for their customers as a service. That is a very expensive way to get your tests completed. You will need full time staff to

complete the testing process and the number of testers needed will be dependent upon the number of backflow devices you have in your Water Utility. Not only will you have to pay for the staff, but also vehicles, equipment needed to complete testing, testing certifications, and other ancillary costs. As an alternative option, most Water Utilities allow certified testers or licensed plumbers to complete tests of backflow devices for customers. This is the most common methodology I have seen amongst many Water Utilities. Utilizing this method, customers can hire independent contractors to complete their tests, the customer is responsible for paying the tester for their services, and the tester is responsible for providing the test data to the Water Utility. A typical process is outlined below.

The current testing procedures, during and after a backflow management program is implemented, are uniform amongst most water utilities.

CURRENT TESTING STEPS

a. Water utility sends letters to customers that have backflow prevention devices indicating that those devices must be tested.
b. Customer is then responsible for hiring a tester that is certified typically be the state in which the test is to be completed. There is a class that testers must attend and pass to become certified.
c. Once the tester is on-site, they complete the task of testing the backflow prevention device and record the data from the test on a state, county, or city/town approved form.
d. The tester is then responsible for mailing, faxing, or emailing the appropriate forms to the water utility for record keeping.
e. What the water utility does with the paper forms once they receive them can vary dramatically. Some Water utilities file the form away and only go back to it if required.

BELOW IS AN EXAMPLE OF A TESTING FORM – This is a general form but depending on your State, County, or Local Laws, you may be required to utilize a specific form for your backflow test reports.

Backflow Prevention Device Test and Maintenance Report

To: _____
(water purveyor or regulatory agency)

_____

_____

Attn: Cross-connection Control Section

The cross-connection control device detailed hereon has been tested and maintained as required by the *(rules or regulations)* of *(purveyor or regulatory agency)* and is certified to comply with these *(rules or regulations)*.

Make of device _____ size _____

Model Number _____ located at _____

Serial Number _____ _____

_____

	Reduced Pressure Devices			Pressure Vacuum Breaker	
	Double Check Devices		Relief Valve	Air Inlet	Check Valve
	1st Check	2nd Check			
Initial Test	DC - Closed Tight ☐ RP - _____ psid Leaked ☐	Closed Tight ☐ Leaked ☐	Opened at _____ psid	Opened at _____ psid Did not open ☐	_____ psid Leaked ☐
Repairs and Materials Used					
Test After Repair	DC-Closed Tight RP- _____ psid	Closed Tight ☐	Opened at _____ psid	Opened at _____ psid	_____ psid

The above is certified to be true.

Firm Name _____ Certified Tester _____

Firm Address _____ Cert. Tester No. _____ Date _____

_____

f. Others manually enter the data from the form into a piece of software and archive the paper forms. Some billing software packages store the data from the forms, if manually entered by the Water Utility, and have the tests associated with the appropriate accounts. However, the data still needs to be manually entered in that situation requiring an investment of time and money on the part of the water utility.

   The transfer of test data from the tester, to the Water Utility, to the regulatory agency, can and should be an automated process. Yearly, Water Utilities have to notify customers that their backflow test is due. That should be an automated process as well. There are many costs to the Water Utility associated with managing a backflow program. That entire process can be automated to eliminate all the costs, to the Utility, associated with managing the backflow program.

Conclusion – Partner with a backflow company that can work with you as a consultant to help your water utility develop, implement, and maintain a state-of-the-art backflow management program. The process of creating your own system can be a daunting task, and many water utilities don't have the resources, time, and sometimes knowledge to do it on their own. VEPO CrossConnex is a vital resource to be utilized by water utilities across the country and can take you step by step through the entire process.

Backflow management programs are essential to the safety of public drinking water. Some water utilities have no programs at all and need to get started, many others have a form of a program, but they need massive improvements. VEPO CrossConnex, through the use of technology, can take you step by step through the process and get your backflow management program where it needs to be. Contact us or subscribe to our website so you can be notified any time that we publish educational articles related to backflow like this one.