Backflow Prevention Program

ADDITIONAL INFORMATION

This document was created to increase public awareness about the Backflow Prevention Program and how it affects the community on a daily basis. The public should be familiar with the potential for contamination of our water supply and the goal of this document is to answer many of the most common questions.

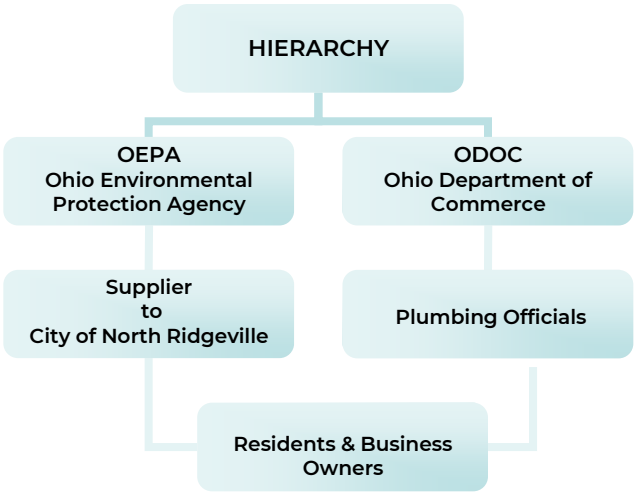
A BIT OF HISTORY & PHILOSOPHY

The development, growth and continuation of any civilization are dependent upon a readily available and safe public water supply. The importance of this supply was evidenced as early as the Roman Empire with its system of aqueducts and distribution systems. In 1894, one of the first papers of record was presented to the New England Water Works Association on the subject of cross-connection appearing as the main culprit in backflow of water. *Cross-connections will be addressed later in this document*.

In 1914, a section of the Ohio General Code placed the responsibility for the control of the public water system in the hands of the State Department of Health by requiring approval of plans prior to the construction of homes, buildings and factories. Our current water treatment plants produce higher quality, safer water than ever before and today we have some of the best water that modern technology can produce. Our everyday conveniences are luxuries in many countries and we enjoy good preventive health services. Our standard of living is topnotch and the key to this standard of living is the public water suppliers who serve the state. Their product makes that standard possible through an abundant supply of quality water.

Often, average Ohioans take the quality of the water delivered to their home, office or factory for granted. They do so because it is presumed that the public water suppliers control the quality of their product closely and this is the charge that Ohio's water suppliers have successfully met for years.

Today, the Ohio Environmental Protection Agency (EPA) pursues protection of the public water supply through the containment principle of backflow prevention. The Ohio Department of Commerce pursues protection of the water users' internal system through the isolation principle of backflow prevention. The foundation that supports the combined effort of these two agencies is the legal authority enacted to protect the public in the form of Ohio Revised Code (ORC), Ohio Administrative Code (OAC) and Ohio Building Code (OBC). Finally, the enactment of local ordinances and regulations which parallel and augment the intent of the state laws is necessary to strengthen the Backflow Prevention Program in our city. The Ohio State laws pertaining to backflow prevention and cross-connection control are authorized by the ORC; the detailed procedures and rules are then specified in the OAC.



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ADDITIONAL INFORMATION

LOCAL AUTHORITY

The City of North Ridgeville (purveyor or supplier of water to the city) and the Ohio Environmental Protection Agency governs the city water supply from the source of manufactured water to the existing meters at the residence or business the city water line supplies.

The Ohio Department of Commerce and the Ohio Plumbing Officials have jurisdictional authority from the containment device at the water meter inside your home or business through all plumbing contained within your building.

COMMON DEFINITIONS AND APPROVED DEVICES

Backflow. Backflow is the flow of water or other liquids, mixtures or substances into the distribution pipes of a potable water supply from any source other than the intended source of the potable water supply. Potable water supply refers to either the water user's system or the public water system.

Cross-connection. A cross-connection is any pipe connection or hose connection directly attached to the city water supply arrangement whereby backflow can occur.

For the purpose of this document, cross-connection shall mean any unprotected actual or potential, connection or structural arrangement between a public water supply and the consumers water supply through which it is possible to introduce into any part of the potable system and used water system (sewer water), industrial fluid, gas or substance other than the intended potable water with which the system is supplied.

This can be a direct, indirect, permanent or temporary connection to a water user's system. **An ordinary garden hose is the most common offender** because it can be easily connected to a potable water supply and is used for a variety of potentially dangerous applications. For example, a common garden hose attached to a water spigot with the end of the hose submerged in a bucket of detergent, cesspool or tank with unknown chemicals or the like has the potential to contaminate the system.

It should be noted that, under certain circumstances, atmospheric vents and relief valves on backflow preventers could also allow the entry of aerosols, toxic fumes or airborne solid particles into the system. Bypass hook-ups, jumper hoses, removable sections, swivel or piping changeover set-ups or any other temporary or permanent connections through which, or because of which, a backflow condition can or will occur is considered to be a cross-connection. The easiest and best way to eliminate the possibilities of contamination to the public water supply is to eliminate any and all cross-connections where feasible.

Backpressure. Backpressure is a reversal of flow due to a cross-connection with a system that operates at a greater pressure than the public water system. Backpressure can occur when there is a cross-connection with an internal system, such as a high-pressure boiler, that operates under a higher pressure than the normal pressure in the public water system. In this instance, one might assume that a closed valve or check valve in the supply system should stop the flow. This would be true if all valves were 100% effective, but unfortunately even the best built valves tend to develop leaks. Sometimes a valve may fail due to from normal wear or deposits that come to rest at the valve seats, which may prevent a tight closure even when the person cycling the valve is sure the valve is closed tight.

Scenario One: Cross-Connection Contamination. If you own a farm or property that before city water supplies were available and your property was supplied water buy way of a well, or cistern and all of a sudden, the city installs fresh water city supply lines to service your home. Over the years, you have

developed a taste for your well water but are forced to use the city system. You still have your well intact and operational and decide to hook up a water line from the well to the city water system and use the well as a secondary or back-up water source. You have now created a contamination condition that will siphon into the city's water supply any time the city's water supply drops in pressure. This is an illegal connection and if backpressure and backsiphonage occurs due to the drop in water pressure, the contamination hazard created is severe and could cause morbidity or death. The homeowner may have no clue as to the severity of hazard that was just created, but this connection type is illegal and there are no safe guards against this connection other than for the city to enforce complete disconnection and deactivation of the connection.

Scenario Two: A hot water boiler system in a local school requires to be operated at a minimum pressure of 50psi. with the proper prevention devices in line of the public water supply. If the public water supply is operating at the normal capacity of 45psi and suddenly the device fails, a backpressure condition will be created because of the greater pressure in the school system than what is in the city system. At this point, the contaminated water that is in the boiler is now flowing backwards through the failed valve into the city water supply creating a pollution hazard.

Backsiphonage. Backsiphonage is the reversal of the normal direction of flow in a system caused by a loss of pressure (negative pressure, vacuum or partial vacuum) in the supply piping. Backflow due to backsiphonage occurs when negative pressure develops either in the water user's piping system or, more seriously, in the community system. If there are plumbing defects in the consumer's piping system then the siphoned water will be contaminated and can contaminate the community supply. In community piping systems, these negative pressures can be caused by city main breaks, planned or emergency shutdowns, fire demands or water use exceeding the hydraulic capabilities of the system. Negative pressures occur more frequently in building piping systems and are caused by insufficient hydraulic capacity or by low pressures in the community water system. Generally, backsiphonage hazards occur more frequently to water consumers within a building or industrial plant than to a community system because the volume of the backsiphonage may not be enough quantity to reach the community's water supply.

DEGREES OF HAZARDS

Before we can determine what type of prevention device will be required at a given location, we must first assess or survey the dwelling for the types of hazards that exist or potentially exist. There are four degrees of hazards that are addressed to measure device requirements in any given situation.

When we first assess or evaluate the degree of hazard at a home or business, we must first take into account the potential for backflow to happen and the toxicity (poisonous) nature of the substance(s) that could backflow into the community water supply. At an existing building, this evaluation is accomplished by an on-site survey of the piping and equipment that is connected to the water user's system.

The Ohio EPA specifies that these four degrees of hazard refer to the seriousness of the problem caused when a contaminant can enter or poses a potential threat to the public water supply and are as follows:

1. **Pollution hazard.** The presence of any foreign substance that tends to degrade the water quality so as to constitute a hazard or impair the usefulness or quality the water to a degree which does not create an actual hazard to the public health but which does adversely and unreasonably affect such waters for domestic use.
2. **System hazard.** A condition, device or practice by the user that poses an actual or potential damage to the physical properties of the public water system or a consumer's potable (fresh) water system.

3. **Health Hazard.** Any condition, device or practice in a water supply system or its operation that creates, or may create, a danger to the health and well-being of its users.
4. **Severe Health Hazard.** Any health hazard that could reasonably be expected to result in significant morbidity or death.

Due to the vast amounts of typical hazards that exist under each of the above categories, we only discuss a few of the more severe or most common.

NOTICE OF IMPORTANCE

Ohio EPA backflow prevention regulations are retroactive; therefore, there is no "grandfather clause" even though the property and water use on that property may have been there before the regulations or ordinance existed. A clear understanding of this regulation will possibly save any potential disputes in the event a survey discloses potential cross-connection or contamination situations. The best protection against backflow is the elimination of all cross-connections. This is not always possible due to the mechanical design and function of some equipment.

STANDARD OHIO EPA APPROVED PREVENTION DEVICES AND COMMON APPLICATIONS

The following is a list of prevention devices and some of the more common applications where they may be required to be installed.

Air gap separation. This type of system is designed for and is mandatory for any system inside a building that has the potential of creating a severe health hazard to the public water system. Air gap separation provides a complete physical separation between the potable water and a non-potable system. The removal of the cross-connection by means of an air gap separation is a positive means of preventing backflow as long as the air gap has been properly installed and maintained. Specific installation descriptions are available.

Reduced pressure principle. This device is required for all system hazards and health hazards and are, at the very least, installed in the building at the meter location and wherever else it is deemed necessary by plumbing officials. If an air gap separation is not feasible, the next most positive mechanical means of backflow prevention is the reduced pressure principal backflow preventer. This device consists of two independently acting check valves operating in series; with an automatically operated differential relief valve located in the zone between the check valves; two tightly closing shutoff valves and four test cock valves.

Double check valve assembly. The double check valve is a very useful device when properly maintained. It is also a reliable means of backflow protection from aesthetically objectionable or degrading materials which are not actually dangerous to health or to the public water system. This type of valve does not give visible signs of failure so it should be checked more frequently than the Ohio EPA and the city requires. This device is authorized to be used in situations that are surveyed to be of the pollution degree of hazard. *(Refer to the previous page on pollution hazards).*

Vacuum breaker. This device is used for preventing backsiphonage by admitting atmospheric pressure to a piping system that is under a vacuum or negative pressure so that a siphon cannot occur or be created. Devices of this nature are identified by several different common names such as vacuum breaker, siphon breaker and backsiphonage preventer. Vacuum breakers do not provide protection against backflow resulting from backpressure. Two types approved for use are the atmospheric vacuum breaker and the pressure vacuum breaker.

Hose bibb vacuum breaker. This device is designed specifically to be mounted on a faucet to prevent backsiphonage. It may be used on a wash basin or laboratory faucet or outdoor hose spigot. This unit can readily be subjected to backpressure by simply having the hose outlet higher than the faucet; however, this device is better than no device at all. The advantage of this device is that it is readily available and relatively low cost to the consumer. This device will not protect against backflow caused by backpressure.

Interchangeable connections. Two styles of interchangeable connections are the swing connection and the four-way valve. These devices are commonly used when there are two sources of water supply, one the city supplies and one of the proprietors. These connections are only used one at a time and are designed so that both supplies of water cannot be used at the same time. When they are used, they must be protected by a reduced pressure assembly as the means of prevention against contamination to the city supply. They both also require separate stop valves on each line connected to the valve.

Barometric loop. This device is only applicable in buildings 35 feet or greater in height because it works on an atmospheric principle of pressure at sea level.

INSPECTION AND TESTING REQUIREMENTS

All backflow devices are required to be inspected at the time of installation and at a minimum of every 12 months. This is a mandatory requirement established by the Ohio EPA. There are situations and conditions in a building that may require a device to be tested more frequently.

If a device has a history of failure or is located in an area that is considered to be a severe hazard, the city can and usually will impose a more frequent test requirement on that specific condition.

If a device fails or indicates through testing that it is not functioning properly or fails any portion of the test, it will need to be rebuilt and tested again. If it cannot be rebuilt, it will need to be replaced by a licensed plumber certified to install these devices. This is the responsibility of the property owner and permits are required for installation. Upon completion of all tests, the user of the water must furnish the supplier of water with the test results of the test within seven working days of that test.

INSTALLATION REQUIREMENTS

Each type of device carries with it its own specific installation requirements, but for the purpose of this document, we will mention general requirements for all types of devices. All prevention devices must be installed in a manner to which they are not subjected to freezing. They all must be mounted in a horizontal position (except those which are designed for vertical installation). All devices must be installed in a location accessible to the tester with the test cocks located facing away from any wall or other obstruction that would prevent the inspector/tester from performing the test. This requirement is also mandatory for adequate space for repair and or replacement.

SURVEYS AND INVESTIGATONS

Ohio Revised Code # 3745-05-03; Adopted Oct. 9, 1980; Effective date Nov. 26, 1980
The supplier of water, which in this case is the City of North Ridgeville, shall conduct or cause to be conducted periodic surveys and investigations, in a frequency acceptable by the City Engineer of North Ridgeville. It is the responsibility of this office to determine water use practices within the consumer's premises and also to identify any possible/potential cross-connections at the consumer's water system which contaminants or pollutants could backflow into the public water system.

The supplier of water or an authorized representative shall have the right to enter premises served by the public water system at all reasonable times for the purpose of making surveys and investigations of water use practices within the premises. Furthermore, the consumer shall furnish the supplier or his representative information on water use practices within the consumer's premises.

Ohio Revised Code # 3745-95-04
Where protection is required:

- Premises where, because of security requirements or other prohibitions or restrictions, it is impossible or impractical to make a complete cross-connection survey.
- Premises having internal cross-connection that, in the judgment of the supplier of water, are not correctable, or intricate plumbing arrangements which make it impracticable to determine whether or not cross-connections exist.
- Premises having a repeated history of cross-connections being established or re-established.

ABANDONING A DEVICE

If you are no longer interested in using the system that requires the backflow prevention device, such as a lawn sprinkler, it can be abandoned. A licensed plumber, certified backflow tester or the homeowner can remove the device and cap off both ends of the piping to ensure the water source will not be adversely affected. A general inspection permit will need to be issued and an inspection completed by the Building Department. If the system is being converted to a different use, such as a hose bibb, then an antisiphon vacuum breaker will need to be installed and inspected.

IN CLOSING, A NOTE FROM THE CITY ENGINEER'S OFFICE

The City Engineer's Office is serious about your safety and are the delegated officials to assure the City of North Ridgeville is protected from all possible foreign properties that could find their way into our fresh water supply. We will make every conceivable effort to provide you with accurate information and keep any cost to you to the absolute minimum and still meet the requirements of the Ohio EPA.

If you have any questions regarding this program, please contact the City Engineer's Office at (440) 353-0842 or by email at backflowreports@nridgeville.org.