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What is a cross-connection?

A cross-connection is any actual or potential connection between a potable (drinking) water system and any source of pollution or contamination.

What is backflow?

Backflow is a flowing back of water or reversal of the normal direction of flow. Backflow may occur due to either back siphonage or back pressure.

What is a backflow preventer?

Simply put, a backflow preventer is a device or assembly that prevents backflow. Some types of backflow preventers require testing to ensure that they will work as intended and there are some that do not require testing.

What is back siphonage?

Back siphonage is backflow caused by a negative pressure (i.e., a vacuum or partial vacuum) in a public water system. The effect is similar to drinking water through a straw. Back siphonage can occur when there is a stoppage of water supply due to nearby firefighting, a break in a water main, high velocities in pipe lines, line repair or break that is lower than a service point, lowered main pressure due to high water withdrawal rate such as firefighting or water main flushing or reduced supply pressure on the suction side of the booster pump.

What is backpressure?

Back pressure is pressure that is greater than the municipal water system supply pressure. It can happen when there is a connection to a non-potable supply operating at a higher pressure than the water distribution system. Increases in pressure can be created by booster pumps, temperature increases in boilers, interconnections with systems operating at higher pressures, and elevated piping (e.g., 30 feet above finished grade).

What causes backflow?

An example is when there is a water main break and the area must be isolated and repaired. When the valves around the repair site are closed, the flow of water is stopped to all points of use such as homes and businesses and begins to flow backwards towards the repair. This is back siphonage and if there are cross connections, contaminants can be drawn into the water system.

What happens after backflow occurs?

When the repair is completed and the regular pressure is restored everything starts to flow in the proper direction. Any contaminants that had a chance to enter the water supply will start to flow

towards any point of use (plumbing fixtures) in homes or businesses. The degree of hazard to health will be dependent on the type and amount of contaminant, the amount of time the situation goes unnoticed and whether or not a protective device is in place.

What does a typical cross connection look like?

A common example is a garden hose connected to a hose bibb at one end and the other end of the hose lying in a pool, puddle or any other source of non-potable water. Another example would be the makeup water for a hot water heating boiler. The water in these systems can be rusty and oily and could pose a health threat if consumed.

Other common cross-connections found in plumbing and water systems include:

- A water softener drain or other type of water conditioning equipment directly connected to a sanitary sewer
- A chemical sprayer attached to a hose without a backflow preventer
- A high pressure washer utilizing soaps or cleaners connected to a hose bib or other sources of water without a backflow preventer
- A lawn irrigation system installed without an approved type of backflow preventer
- Using a hose to unplug blocked toilets and sewers
- Photo developing equipment
- An auxiliary water supply connected to a municipal supply
- A toilet that does not have an anti-siphon float valve installed

Why do water purveyors (supplier) need to control cross-connections and protect their public water systems against backflow?

Backflow into a public water system can pollute or contaminate the water in that system. The hazard created by backflow is generally identified in three groups: severe or high, moderate and minor. A severe hazard is likely to result in serious injury or death while a minor hazard may simply affect the colour, odour and/or taste of the water with little or no health effects. Each water purveyor has a responsibility to provide water that is usable and safe to drink under all foreseeable circumstances. Further, the expectation of the public is that water quality supplied by the water purveyor is potable and safe to use and it will remain so regardless of its use. For these reasons, each water purveyor must take reasonable precautions to protect its public water system against backflow.

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What should a water purveyor do to control cross-connections and protect their public water systems against backflow?

A water purveyor should ensure that a proper backflow preventer is installed and maintained at the water service connection to each system or premise that poses a hazard to the public water system (premise isolation). Generally, this would include water service connections to each dedicated fire protection system or irrigation piping system; premises with an auxiliary or reclaimed water system; industrial, medical, laboratory, marine or other facilities where objectionable substances are handled in a way that could cause pollution or contamination of the public water system; premises exempt from Part 7 (Plumbing) of the Ontario Building Code and premises where an internal backflow preventer required under the Ontario Building Code is not properly installed or maintained; classified or restricted facilities; and tall buildings. Zone protection within a facility may be required in addition to premise isolation, a requirement in order to protect users of the facility.

How can backflow be prevented?

The simplest way is to eliminate the cross connection from the water distribution (plumbing) system. Where this is not possible, a backflow preventer (BFP) must be installed. A BFP is a means or mechanism to prevent backflow. The basic means of preventing backflow is an air gap, which either eliminates a cross-connection or provides a barrier to backflow. An air gap is easily circumvented however is not always the most appropriate type of BFP to use. The basic mechanism for preventing backflow is a mechanical backflow preventer, which provides a physical barrier to backflow. The principal types of mechanical backflow preventer are testable devices such as the reduced-pressure principle assembly, the pressure vacuum breaker assembly, and the double check valve assembly. There are other types of BFP's available for secondary types of protection that are not testable.

Why do backflow prevention devices have to be tested periodically?

Mechanical backflow preventers have internal seats, springs and moving parts that are subject to fouling, wear or fatigue. These mechanical devices and air gaps can also be by-passed. Therefore, some backflow preventers have to be tested periodically to ensure that they are functioning properly and others such as an air gap require a visual check to ensure that they are still in place. The testable backflow preventers must be tested by someone that has had proper training and is qualified to do so. Refer to the training and certification pages for more information on this.

Where can I get more information about cross connection control?

- CAN/CSA-B64.10-11 CAN/CSA-B64.10.1-11 Standard
- Manual for the Selection and Installation of Backflow Prevention Devices

- Manual for the Maintenance and Field Testing of Backflow Prevention Devices
- Ontario Building Code – Part 7 Plumbing
- EPA's Cross Connection Control Manual
- AWWA Canadian Cross Connection Control Manual

Who is responsible for establishing and administering a cross connection control program?

It is important to note that the responsibility for establishing and administering a cross-connection control program is with the individual municipality or water purveyor (authorities). For this reason there may be differences between the types of cross connection program that different authorities may have implemented. For more information on individual programs you should check with your respective municipality or supplier of water.