Public Utilities Department
Backflow/Cross Connection Informational Meeting
February 24, 2004

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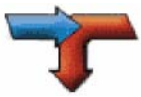
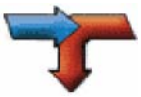
Codes and Regulations

The Safe Drinking Water Act was originally approved and passed into public law in 1974. In 1986 the Safe Drinking Water Act Amendments were introduced as Public Law 99-339 states the water purveyor is responsible for the integrity of the water supplied from the distribution system and has the primary responsibility for preventing water from unapproved sources, or any other substances from entering the public potable water system. However, the Safe Drinking Water Act does not imply that the water purveyor is in any way responsible for the customers plumbing system.

In North Carolina, the Department of Insurance enforces building codes. The North Carolina Plumbing Code Section 608 pertains to the elimination of cross connections and installation of backflow prevention assemblies within the consumers plumbing system.

The Department of Environmental Health and Natural Resources requires all water suppliers to deliver safe drinking water to the consumer. All water suppliers with five testable backflow prevention assembly devices within their water system were required to adopt a backflow/cross connection program by June 30, 2003. The Town of Boone chose to insert our backflow/cross connection program into the Town of Boone Water Use Ordinance as Article IX, Cross Connection Control Standards and was approved by Town Council on June 26, 2003.

The Town of Boone is required to have a cross connection control program because of the potential dangers of backflow. It is necessary to control cross connections therefore a mechanical device has been designed. Once it has been installed, it will prevent contaminated water from re-entering the distribution system. These devices are called “Backflow Prevention Assemblies”. They are required to be installed on all commercial water lines, lawn irrigation lines, and fire sprinkler line connected to the Town of Boone’s distribution system.

Cross Connections and Backflow

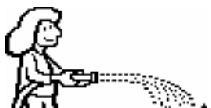
A cross connection is a permanent or temporary piping arrangement which can allow your drinking water to be contaminated if a backflow condition occurs. There are two types of cross connections, direct and indirect. A “direct” cross connection is subject to both back pressure and back siphonage, while an “indirect” cross connection is subject only to back siphonage. The following list is a few examples of cross connections:

Garden hoses attached to water supply that are placed in buckets of standing water, chemicals, or in swimming pools, pets watering bowls, and garden sprayers. (Indirect Cross Connection)

Water faucet that is not high enough to avoid contact with standing water or chemicals.
(Indirect Cross Connection)

The overflow tube in the toilet tank installed at an improper height, which could allow the fill valve to become submerged. (Indirect Cross Connection)

Landscape watering systems that inter-connect city water with an irrigation water supply. (Direct Cross
Connection)



Fire pressure pump tied into sprinkler system and connected to the city water supply.
(Direct Cross Connection)

Water distribution systems are designed with the intention of the water flowing in a certain direction, from the distribution system to the consumer. However, hydraulic conditions within the can change from normal conditions, causing the water to floe in the opposite direction. This is called “Backflow”. Backflow can occur in two ways:

Back Siphonage; sometimes the pressure in the distribution system will drop because of water main breaks or the opening of fire hydrants and create a siphon affect and cause the water and or contaminants from the consumer side to be siphoned back into the distribution system. This is called Back Siphonage.

Back Pressure; some customers have objectionable materials on their premises under pressure by the use of pumps, injection units, boilers, etc. The large amount of pressure will cause the water and or contaminants from the consumer’s side to push its way back into the distribution system therefore, contaminating the distribution system. This is called Back Pressure.

Examples of Backflow Incidents

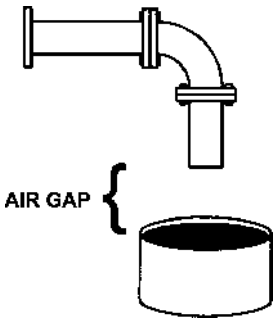
A) On April 24, 1986, the Fayetteville Times reported that a pesticide contaminated what appeared to be a “small” part o the Hope Mills water system, prompting the town to warn residents of about 23 households not to drink their water. Authorities believe the problem occurred when a waterline broke along North Main Street. Workers from a pest control service were filling one of their pesticide truck tanks with water when the break occurred and pressure in the waterline was reduced, causing material from inside the tank to be sucked into the building’s waterline and out to the town’s water main. The pesticide, containing the chemicals chlordane and heptachlor, contaminated what appeared to be a small portion of the town’s water supply. A device (Hose Bib Vacuum Breaker) on the outside water faucet designed to protect the buildings water system from such an incident malfunctioned. This is an example of how back siphonage can occur.

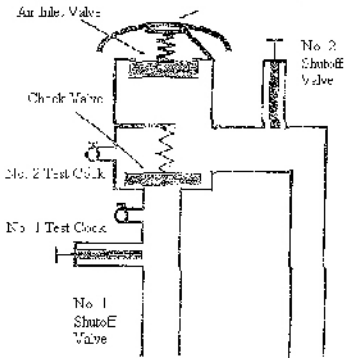
B) On December 7, 1974, in a moderate size city in North Carolina, a major fast food chain restaurant received complaints of a bitter taste in the soft drinks they were selling. Over 300 people were served soft drinks during the period in question. Syrups were changed several times but to no avail. The local water department was notified and an investigation was immediately started. The local water department traced the problem to a chemical in the water and determined this particular chemical was used to treat boiler water in a fertilizer plant, located one-half mile away from the restaurant. Investigation at the fertilizer plant revealed that a check valve on the supply line to the boiler was leaking and allowed the chemical in the boiler to backflow into the street water main supplying the restaurant. This is an example of how back pressure can occur.

C) The chief plumbing inspector in a large southern city received a telephone call advising that blood was coming from drinking fountains at a funeral home. Plumbing and health inspectors went to the scene and found evidence that blood had been circulating in the potable water system within the funeral home. They immediately ordered the funeral home cut off from the public water system at the meter. City water and plumbing

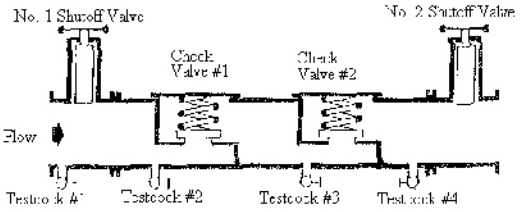
officials did not think the water contamination problem had spread beyond the funeral home, but they sent inspectors into the neighborhood to check for possible contamination. Investigation revealed that blood had back flowed through a hydraulic aspirator into the potable water system at the funeral home. The funeral home had been using a hydraulic aspirator to drain fluids from bodies as part of the embalming process. The aspirator was directly connected to a faucet at a sink in the embalming room. Water flow through the aspirator created suction used to draw body fluids through a needle and hose attached to the aspirator. When funeral home personnel used the aspirator during a period of low water pressure, the potable water system at the funeral home became contaminated. Instead of body fluids flowing into the wastewater system, they were drawn in the opposite direction into the potable water system. This is also an example of back siphonage.

Types of Backflow Prevention Assemblies





Double Check Valve Assembly DCVA



Reduced Pressure Zone Assembly
RPZ