



STATE OF CONNECTICUT

DEPARTMENT OF PUBLIC HEALTH
ENVIRONMENTAL HEALTH SECTION
PRIVATE WELL PROGRAM

Are You Being Double-Crossed by Your Plumbing?

There are few public health problems that are as little understood and as insidious as those of cross-connections in potable water systems (public or private). These problems become all too obvious when they occur because they usually affect a large number of individuals. You may remember the hepatitis outbreak at Holy Cross University back in October of 1969. It affected approximately 90 persons and caused the cancellation of the remainder of the football season. Submerged sprinkler heads and a neighborhood child infected with hepatitis were the culprits.

There are many definitions of a cross-connection but the simplest to understand is: "any connection or structural arrangement between a potable water system and a non-potable source, liquid or otherwise, through which backflow can occur".

Backflow is defined as "the flow of water or other liquids, mixtures, or substances into a potable water system from any source, other than the intended source". Backflow can be divided into two types: Backpressure (excessive positive pressure) and backsiphonage (negative pressure or a vacuum), both resulting in flow reversal.

The cross-connection may be direct as in a swing connection, a valved connection or a water-cooled condenser directly connected to a waste/soil line; or indirect as in a submerged faucet end in an old style sink or bathtub or a hose left in an open tank of fertilizer.

It will not be necessary to detail the theories of backflow & backsiphonage in this article. Just think to yourself, when one views a questionable piping arrangement, can a flow reversal (either by pressure or vacuum) contaminate the potable supply.

The above wording not only applies to public water but also private water systems. When the well pump shuts down a foot valve or ball check valve holds the column of water in the discharge or suction pipe. If the valve is faulty and leaks, the water falling down the discharge pipe will create a backsiphonage condition. This could draw contaminated water from devices such as old style toilet tanks to other fixtures in the home, pesticide siphon applicators attached to your garden hose or the submerged hose that's filling your pool. The writer personally witnessed blue water from a second floor toilet tank coming out of a basement sink faucet while I was collecting samples. A leaking fixture or a sudden increase in water demand in the home (clothes washer going on) along with a submerged fill tube in the toilet tank set the stage for a backsiphonage event. A toilet tank retrofitted with a proper backsiphonage device and the installation of hose bib vacuum breakers on the outside faucets would prevent these events from occurring.

Backpressure is rare in a home but can occur. For example if a home is equipped with a hot water heating system



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and the boiler pressure in the furnace exceeds the domestic water pressure, water from the boiler will enter the home's plumbing system. An installation of a continuous pressure vented backflow device on the boiler fill line would prevent this from happening. You may have noticed a built-in "air gap" on your clothes and dishwasher fill-lines. Is backflow possible with your automatic lawn irrigation system?

There are many devices and ways to prevent backflow in the home. A few common ones are:

- a simple air gap (the best way)
- simple check valves (ball or clapper)
- sophisticated reduced pressure zone backflow preventers.

There are other types of devices but they are either impractical, such as barometric loops; or they are no longer approved for use, such as four-way plug valves, swing connections and replaceable spool pieces. When purchasing any treatment device/system, make sure it has a NSF or UL listing.

Because of the health significance, it is the responsibility of all local sanitarians, certified building officials, sanitary engineers, plumbers and health educators to see that cross-connections are not inadvertently created. Additionally any cross-connection prevention device must be properly installed and maintained. Cross-connections can and do happen in private well systems. Keep this in mind when the next homeowner calls with a strange (blue water?) water quality complaint.

Should you have further questions please contact your local health department or the state Environmental Health Section, Private Well Program at (860) 509-7296.

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