

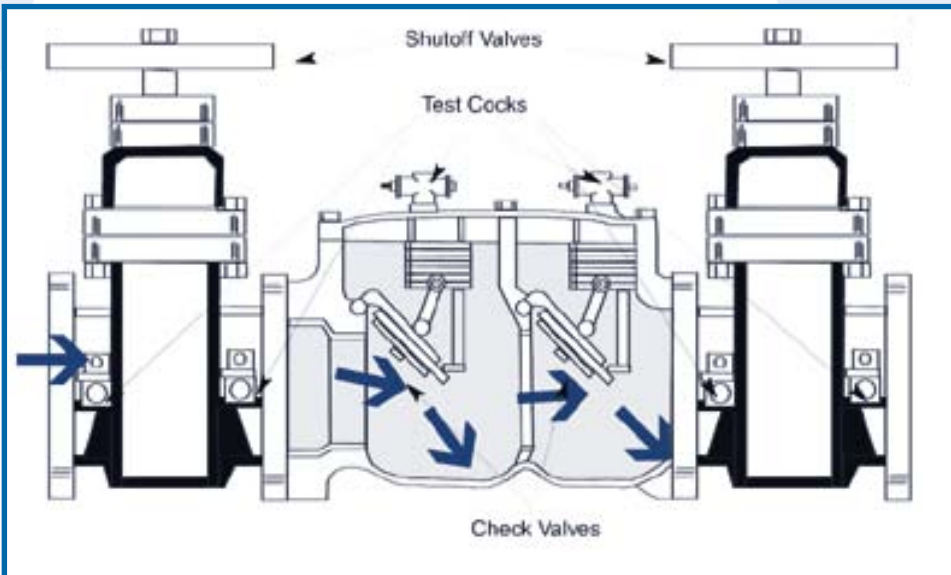
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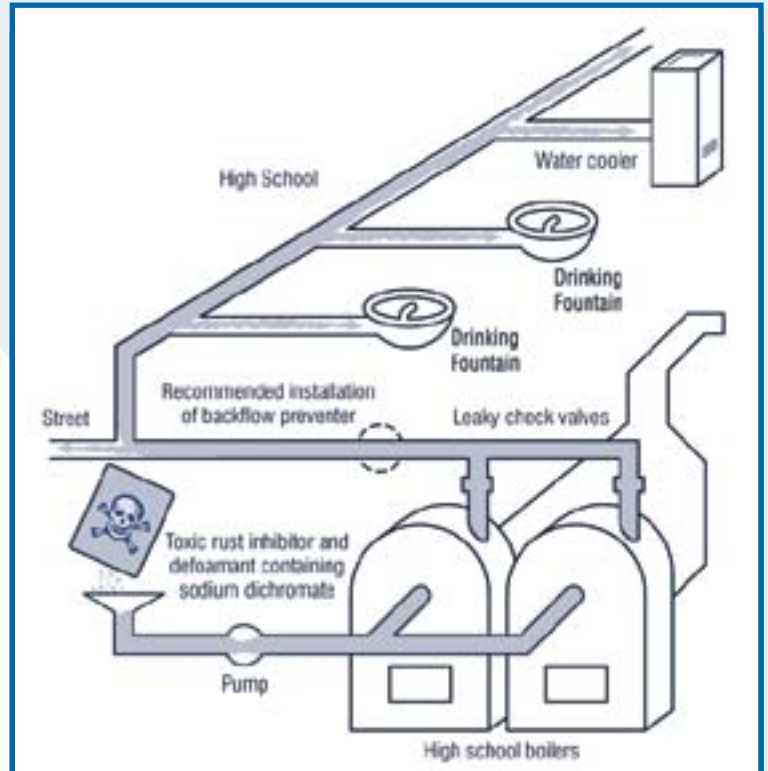
Cross Connection and Backflow Prevention

By **Zane Satterfield, P. E.**, NESCS Engineering Scientist

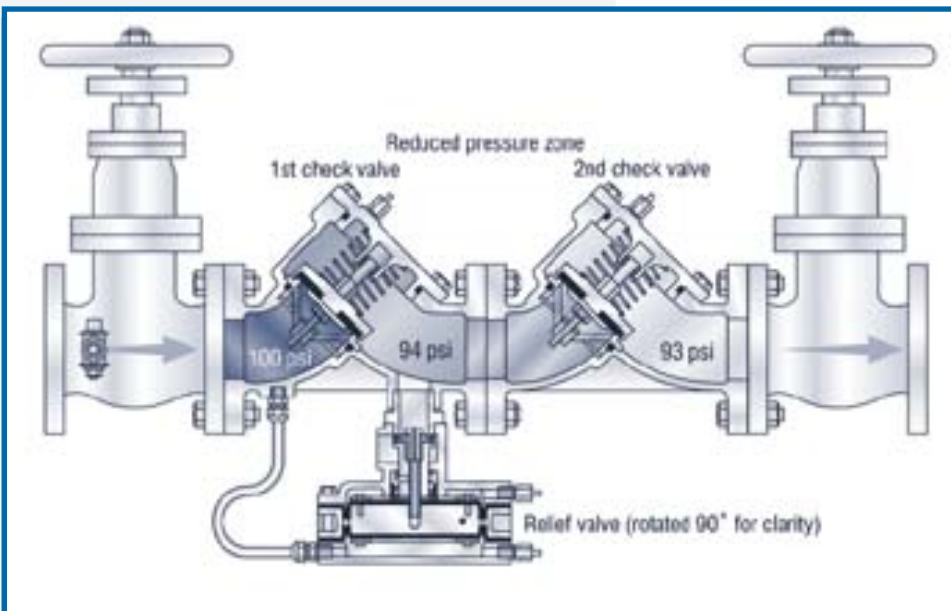
Plumbing cross connections can link a potable water supply to a contamination source, causing a serious public health hazard. Cross connections can be controlled, but it takes vigilance and knowledge to carry out a good cross-connection control program. This poster illustrates some mechanical devices and methods used to control cross connections in commercial and industrial applications as well as for homeowners.



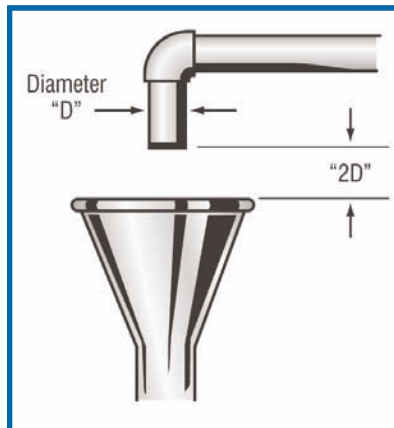
A double check valve or double check assembly consists of two check valves assembled in series usually with a ball valve or gate valve installed at each end for isolation and testing. Test cocks (very small ball valves) are in place to attach test equipment for evaluating whether the double check assembly is still functional (in most states it is important to have the test cocks to be approved backflow devices).



This is a typical situation in public buildings where prevention devices like RBPB should be used.



A reduced pressure zone backflow preventer (RBPB) has two spring check valves with a pressure-relief valve located between them that can be vented to the atmosphere.



An air gap is the most effective way to prevent cross connection and backflow. An air gap can be thought of as a no-fail check valve that doesn't have an internal seat or any moving parts. However, air gaps are not possible for all situations. Therefore, other devices to prevent backflow and backsiphonage must be available.



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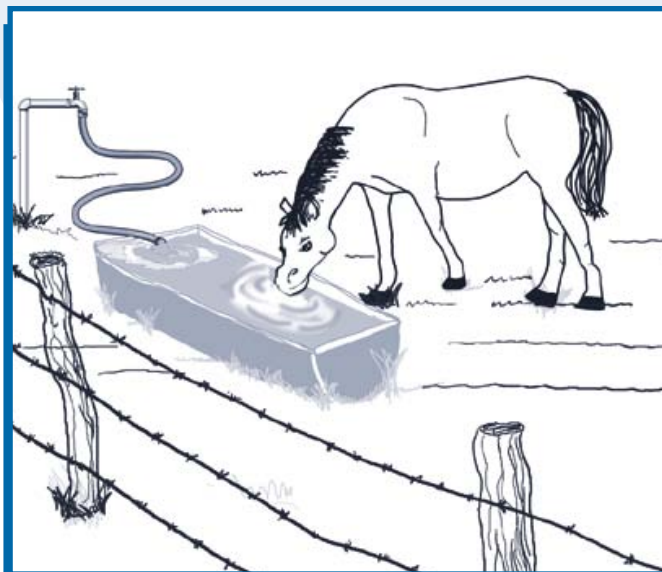
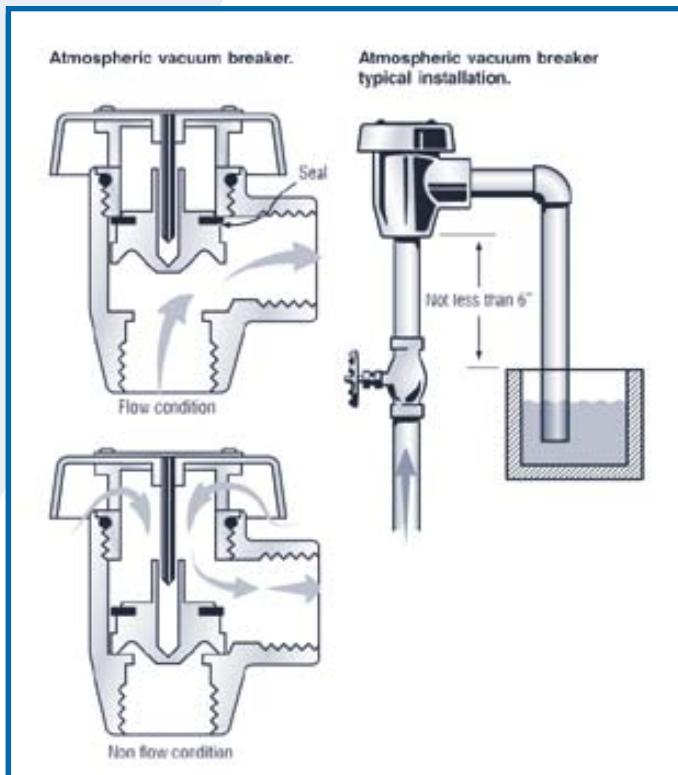


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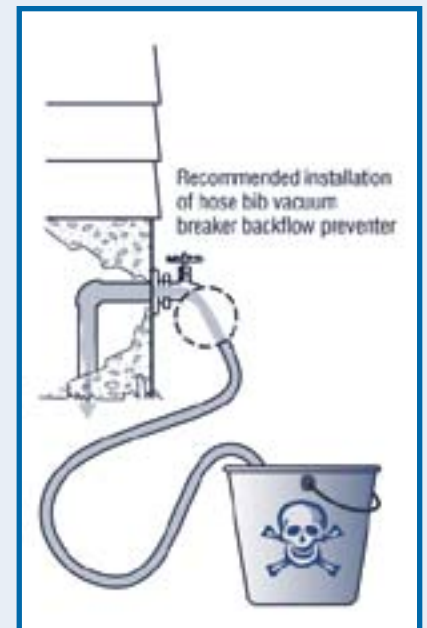
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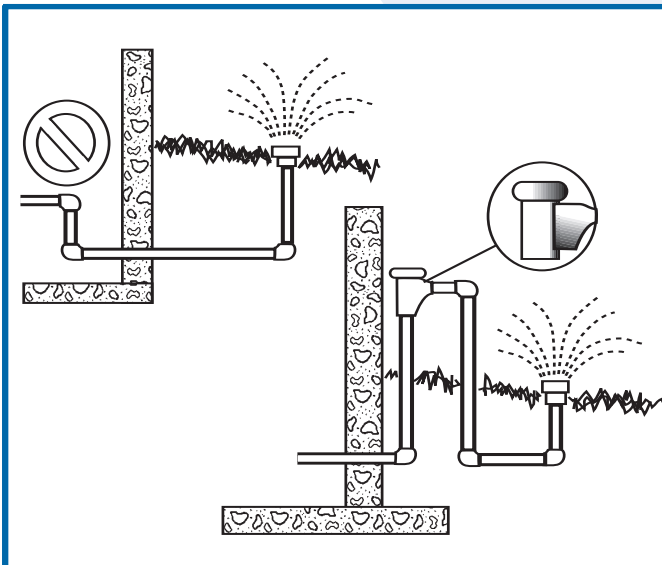


A typical frost-free hose bib with no vacuum breaker—a common situation where a vacuum breaker should be installed.

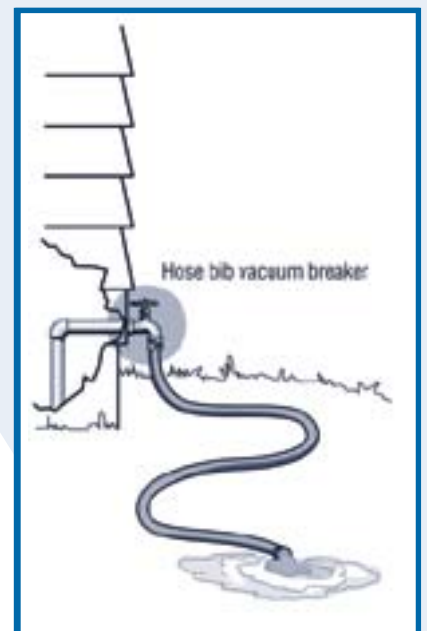


A vacuum breaker should be installed on all hose bibs.

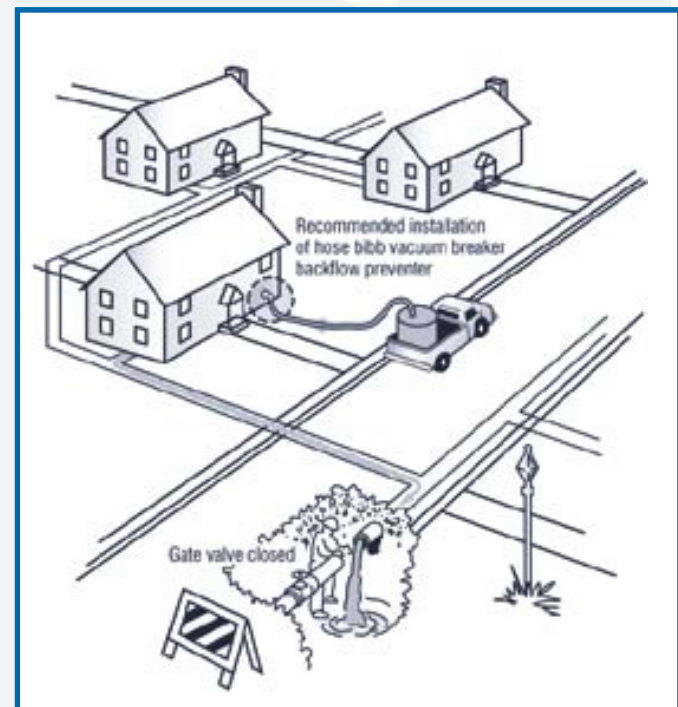
A properly installed vacuum breaker (atmospheric vacuum breaker) provides excellent protection against backsiphonage. For example, if the flow in the pipe is stopped, a vacuum breaker valve drops down, closes the water supply entry, opens an air vent, and prevents contaminants from being siphoned into the water supply. Vacuum breakers do not protect against backpressure.



Lawn irrigation systems need a vacuum breaker backflow preventer to protect against lawn chemicals being drawn into the drinking water supply.



Typical hose bib with no built-in vacuum breaker—a simple screw-on vacuum breaker can be installed.



In most circumstances, homeowners should install a hose bib vacuum breaker backflow preventer. A hose bib, also called a bibcock or sillcock, is typically used to provide hose connections outside of buildings. The downstream side of the valve (faucet) is threaded to match standard garden hoses. A typical situation that could cause backsiphonage is when a break occurs in a waterline that requires workers to shut off valves in the surrounding area to make repairs. Water can then drain out of the lines and siphon contaminants into the water supply.

References:

- Bhardwaj, Vipin. 2004. "Tech Brief: Cross Connection and Backflow Prevention," *On Tap*. National Drinking Water Clearinghouse: Morgantown, WV.
- U.S. Environmental Protection Agency. 2003. *Cross-Connection Control Manual*. Washington DC: EPA (Available as a product from NDWC, item #DWBKDM03)
- Resort Municipality of Whistler, <http://www.whistler.ca/content/view/237/>
- Watts Water Technologies, Inc. Canada. 2006. *Backflow Prevention/Learn About. Educational Resources to Keep You Informed*. www.wattscanada.ca/pro/divisions/backflowprevention/learnabout/learnabout_usc.asp. Accessed on May 22, 2007.
- <http://encyclopedia.thefreedictionary.com/Hose+bib> Accessed on November 27, 2007.
- http://en.wikipedia.org/wiki/Double_check_valve. Accessed on November 27, 2007.
- The Source About Air. 2007. A Quick Word About Air Gaps. www.airgap.com/about_airgaps.htm. Accessed on November 27, 2007.



A typical screw-on vacuum breaker for a hose bib.



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