BPMA/ABPA Backflow Prevention Scholarship Competition

Thanks to the reliability of local water utilities and federal and state health and building laws, most Americans have come to expect clean water. No one really expects to be drinking bacteria-infected water, and for the most part, water utilities have kept up their end of the bargain. Nonetheless, the possibility of water contamination, particularly through backflow, remains a serious health concern. Backflow is just what its name suggests- the reversal of the intended flow of fluids that results in contaminants entering the drinkable water system. In urban and suburban areas in particular, where industrial and residential districts frequently overlap, backflow is a real concern. Backflow prevention and cross-connection control programs are thus always a top priority for utilities.

Backflow occurs through cross-connections, in which potable and undrinkable water lines may overlap. Since fluids travel from areas of high pressure to low pressure, whenever the drinking water supply is under lower pressure than the non-drinking water system at a cross-connection, contamination will occur. The two specific forms of backflow contamination are back-siphonage and backpressure. Back-siphonage occurs when the drinking water pipeline is operating under negative gauge pressure, in a partial vacuum. The drinking water system then draws, or siphons, the water away from the higher-pressure non-drinking water system, resulting in a corrupted drinking supply. On the other hand, with backpressure, the recycled, undrinkable water supply is under increased pressure, crossing lower pressure potable pipelines. The contaminated water is then forced in to the clean water system. Factors of comparative height of water systems, operation of pumps, and the width of pipelines influence the relative pressures of the potable and recycled water supplies, and ultimately play a role in creating backpressure and back-siphonage.

To prevent backflow, the Irvine Ranch Water District, the water utility that serves my area, has implemented a strict cross-connection control program as mandated under California state law. The Irvine Ranch Water District’s program is largely a collaborative effort, with the involvement of the water

consumers, the local health agency, and the water district itself. Agency supervisors and water district employees routinely check the water pipe systems of manufacturing sites for plumbing problems or possible cross-connections. The testing begins even before construction of a new site is completed. With the initial survey, building and piping schematics are closely reviewed to find potential cross-connections and plumbing problems. A follow-up survey, after construction is completed, is then done to check the pipes as they are operating, with considerations for pipe interactions with the water systems of surrounding buildings.

As a further precaution, the Irvine Ranch Water District utilizes a dual distribution system with two independent pipe systems when serving recycled and potable water. One system exclusively supplies potable water and the other non-drinking water. The systems are plainly marked in order to avoid any potentially dangerous confusion. A reduced pressure principle backflow assembly is built in to the system to serve as an additional check against backpressure and back-siphonage. Before starting recycled water service, a shutdown test is also performed. Besides the reduced pressure principle backflow assembly that the District installs, other backflow prevention devices are required on properties that are served with both drinkable and recycled water. There is a limited list of backflow prevention assemblages that are approved for usage in my area. The devices are moreover only approved for operation under certain conditions, with different assemblages approved for use in different situations in accordance with a consumer's water needs. Such limitations ensure that the assemblages in use are of the highest quality and reliability and are used when they are most appropriate.

Although the Orange County Health Care Agency and the Irvine Ranch Water District administrate the testing, it is the consumer's responsibility to ensure that the backflow prevention device on his property is routinely inspected. Inspections must occur on at least an annual basis. If there has been a history of past system failures, testing may occur more often. One month before testing is required in a given one-year window, the Irvine Ranch Water District issues a reminder of the deadline, providing the required

administrative documents and some names of available Orange County Health Care Agency-approved inspectors. If the inspection is not completed before the deadline, another one-month warning is issued. If again, testing is not completed before the designated deadline, a final warning is issued that allows another ten days for inspection. If the ten days elapse without action, the utility then shuts down service until the backflow prevention device is tested and meets the District's standards. Any defects that are found are to be promptly corrected. Such measures are necessary to ensure that all backflow prevention devices in operation are in good working condition and are not going to jeopardize the public water system. Testing also provides a fair and accurate assessment of the safety of the District's potable water supply.

Although it is difficult to say whether any sort of protection system is adequate, as health and safety is of such primary importance, the Irvine Ranch Water District has taken numerous steps to ensure that the local drinking supply remains clean and potable. Plumbing codes are enforced to provide fair and safe guidelines for construction that minimize the likelihood of backflow. Surveys are specifically conducted to prevent cross-connections from ever materializing. The initial surveys that assess the likelihood of cross-connections emerging from a industrial or commercial project's very inception are very comforting signs of a District that sincerely cares about backflow, showing that the District's priorities lie with the safety and health of its consumers. The follow-up survey similarly ensures that when a building plan is fully in place and operating, no unforeseen cross-connections arise. Additionally, with yearly inspections that are strictly enforced, backflow prevention devices are appropriately monitored to protect against possibly disastrous mechanical malfunctions. All these measures are fair and seemingly effective. While providing reliable protection through multiple rigorous inspections, the programs are not overly demanding and can be conducted efficiently with little inconvenience to all parties involved.

As effective a program may be, there is always room for improvement. It is sobering to note that despite its thorough backflow prevention and cross-connection control measures, the Irvine Ranch Water

District has had two backflow incidents within the past decade. (Both incidents, fortunately, posed no real danger to the public water supply.) What steps, then, could be taken to improve the District's programs? First off, an examination of the causes behind the backflow incidents should be conducted. One of the cited backflow incidents arose from a simple misunderstanding of the District's Rules of Service. The incident was an example of human error, not a failure of the implemented backflow prevention program. The second incident, which occurred in 1995, is more troubling. A cross-connection was found at a site that had undergone considerable landscaping changes. The initial surveys presumably had been conducted successfully but the water line changes that took place under secondary construction were apparently not examined until it was too late. From that example, a fairly simple improvement to the Irvine Ranch Water District's backflow prevention program can be made. Testing for cross-connections should not only occur before and immediately after primary construction, but also whenever significant improvements are being made that will affect water pipelines. Another improvement that could be made would be to eliminate the last ten-day warning period for backflow prevention device inspections. A two-month allowance for testing is more than fair; any longer could prove an unnecessary health risk for the people in my area. These suggestions are admittedly not drastic changes. This is a testament to the overall effectiveness of the already implemented system.

Enforcing extensive testing and rigorous plumbing codes, the District has done as much as it reasonably can to prevent backflow. The backflow incidents that have occurred have been promptly contained with minimal public impact. The Irvine Ranch Water District has an excellent record and reputation in all aspects of its service, including its backflow prevention program. I personally have full confidence that the water I am drinking is safe and clean, a confidence that I believe all Americans are entitled to. A knowledgeable, concerned public together with health-conscious utilities can fully address the need for thorough and effective backflow prevention programs, making backflow-safe potable water supplies a reality.

Works Consulted (all essay information derived from these sources)

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January 23, 2004