Cross Connections and Backflow

1) What is a cross connection?

A cross connection is a point in a plumbing system where the potable water supply is connected to a non-potable source. “Potable” water is water fit for human consumption. A cross connection exists whenever the drinking water system is or could be connected to any non-potable source (plumbing fixture, equipment used in any plumbing system). Pollutants or contaminants can enter the safe drinking water system through uncontrolled cross connections when there is a backflow occurrence. Some common cross connections found in plumbing and water systems include: wash basins and sinks, hose bibs, irrigation sprinkler systems, photo developing equipment, swimming pools, hot tubs and fire sprinkler systems.

2) What is Backflow?[1]

Backflow is the unwanted reversal of flow of non-potable substances back into the consumer’s plumbing system and/or the public water system drinking water. ***There are two kinds of back flow: backsiphonage and backpressure.***

> ***Backsiphonage*** is backflow caused by a negative pressure in the supply line to a facility or plumbing fixture, Backsiphonage may occur during waterline breaks, when repairs are made to the waterlines, when shutting off the water supply, etc.
>
> ***Backpressure*** backflow is caused by a downstream pressure that is greater than the upstream or supply pressure in a public water system or consumer’s potable water system. Backpressure can inadvertently result from an increase in downstream pressure, a reduction in the potable water supply pressure, or a combination of both. Increase in downstream pressure can be created by pumps, temperature increase in boilers etc. Reduction in potable water supply pressure occurs whenever the amount of water being used exceeds the amount of water being supplied, such as during water line flushing, fire fighting or breaks in water mains.

Backflow can also be the result of a deliberate act undertaken in secrecy. This danger is widely acknowledged by water system professionals. A recent professional journal recognized that, “a pump with a large enough motor could reverse the water flow into a single connection and send contaminants into

nearby residences and workplaces. Almost every home and building within a public water system has unprotected access to the distribution system; one sociopath who

[1] Source: American Water Works Association, Pacific Northwest Section

understands hydraulics and has access to a drum of toxic chemicals could inflict serious damage pretty quickly to a water supply system."[2]

3) Can backflow be **detected before it happens?**

No. There is no way to detect backflow before it happens.

4) Can backflow be detected while **it is happening?**

The beginning of a backflow attack probably would be marked by a sudden drop in water pressure in a targeted neighborhood as the flow of water into a home or business was stopped. The pressure would then climb as the flow of water is being reversed.

Utilities regularly monitor system-wide water pressure, because a sharp and unanticipated decrease can indicate that a pipe has burst. In recent months, many utilities have increased their vigilance. Sensors at pumping stations easily detect water main breaks, but officials also concede that it would be difficult to actually spot the minor drop in pressure signaling the start of a backflow attack from a business or residence. The smaller the pipe, the harder it would be to notice. This led one water professional to state, "... whether we would notice if someone was pumping into the system, that is not likelY."[3]

5) Are water utility officials concerned about backflow?

Across the country, water utility officials are taking steps to prevent terrorists from reversing the flow of water into a home or business which can be accomplished with a vacuum cleaner or bicycle pump and using the resulting "backflow" to

push poisons into a local water distribution system. Such an attack would use utility pipes for the opposite of their intended purpose: instead of carrying water out of a tap, the pipes would spread toxins to nearby homes or businesses.

Water utility officials say the backflow threat dominates their post-Sept. ***11*** discussions with law enforcement personnel. Officials say the biggest threat to the nation's water supply may be from the pipes that carry the water, not the facilities that store or purify it.

"There's no question that the distribution system is the most vulnerable spot we have. Our reservoirs are really well protected. Our water-treatment plants can be

2 Gay Porter Denileon, editor of *QpFlow,* a publication of the American Water Works Association

(AWWA), May 2000.

~ Milwaukee Water Works Superintendent Carrie Lewis

surrounded by cops and guards. But if there's an intentional attempt to create a backflow, there's no way to totally prevent it."[4]

6) What can be done to prevent a backflow attack?

The only sure way, water officials say, is installing valves to prevent water from flowing back into the pipes. Many homes have such valves on toilets and boilers. But virtually none have them on sinks, in part because water officials long assumed that the biggest threat they faced was natural, such as an earthquake or flood. Water officials say retrofitting existing structures with the valves would be prohibitively expensive.

"We're used to natural incidents. We're ready for them. But we've never really looked at what could happen if someone really wanted to come and get us. And that's a hard adjustment to make," noted John Sullivan of the Association of Metropolitan Water Agencies.

Additional Resources: *Wall Street Journal,* Florida State Dept. of Environment Protection,

American Water Works Association – Pacific Northwest Section, *Milwaukee Journal Sentinel.*

~ Milwaukee Water Works Superintendent Carrie Lewis