An Innovative Concept for a Dual Water System in Older Cities

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Since the 18th and 19th centuries, citywide water distribution systems have been designed for fire protection. Over time, the use of these systems was extended to provide water to commercial and residential properties, but their primary function continues to be distribution of water to fight fires. Providing high-quality drinking water to city residents was an added benefit provided by these systems. To accommodate the needs of fire protection, pipes and storage tanks tended to be larger. This results in extended residence times that can cause a degradation in drinking water quality. The good news is that these aging conventional systems offer modern cities a unique opportunity to create the foundation for a dual water system that can: - shorten detention times, - produce higher-quality water, - reduce trihalomethanes (THMs) and haloacetic acids (HAAs), - minimize “red water” calls and odor problems, - save energy, - save money and - conserve potable water. This foundation can be developed during a routine pipe rehabilitation process. Instead of installing the temporary piping required to bypass distribution lines while they are being cleaned, relined or replaced, utilities can install permanent, stainless steel, small-diameter pipe that provide for the potable water needs of their customers. Once the existing pipes are rehabbed, the new lines can function as the drinking water distribution system and the existing large-diameter fire lines can be converted to provide high-quality reclaimed water to meet all non-potable water needs. Even if not converted immediately to reclaimed, the addition of a smaller diameter system will yield immediate improvements in water quality by reducing detention time in the potable system while continuing to provide fire protection through the larger diameter pipes. This approach may be of particular interest to utilities whose systems rely on raw water supplies that may contain endocrine disrupters (EDs) and pharmaceuticals and personal care products (PPCPs). Small volumes of potable water can be more economically treated with reverse osmosis (RO) or other methods to reduce these and other potential compounds of concern. Even without RO treatment, smaller diameter drinking water distribution systems can create shorter detention times and help reduce THMs and HAAs. In addition, smaller-sized elevated storage tanks, or more reliable redundant pumping for the new, smaller system, may reduce installation costs. And by using stainless steel, the “C” factor can be improved and the pumping costs lowered while producing higher water quality and reducing “red water” calls and odor problems. Additional savings may be gained by eliminating the ammonia feed to meet regulations on both the new potable system or the existing system rehabbed for reclaimed water use. Locational running averages (LRA) for THMs and HAAs should be lower, thereby making regulatory compliance much easier. Even if the reclaimed conversion never occurs, the benefits of drinking water quality gained from a dual system when installed as a part of a rehabilitation program may make it a feasible approach to providing high-quality drinking water distribution.