**UF Membrane Technology Creates New Opportunities for Small Public Water Systems**

**Introduction**

In spite of rapid growth, western states offer a unique quality of life and still have many wide-open spaces. With homes and businesses dispersed across vast distances and rugged terrain, small public water systems (PWS) are challenged to ensure public health safety and adequate drinking water supplies to new residents and guests while encouraging continued growth.

By Jack E. Barker

When searching for a PWS filtration solution, there are several things to consider:

- Public health/water quality is the primary concern of any water purveyor—we must be very secure in the knowledge that we are producing drinking water of the highest possible quality. We need to ask if the technology selected is the best available for a particular small system. In Colorado and many other states, a filtration system must be approved by a regulatory agency and meet drinking water design criteria. If you are using a filtration system to meet the requirements for a PWS, familiarity with federal, state and local requirements is necessary. Part of our due diligence includes reviewing the relevant ANSI/NSF approvals for each technology. ANSI/NSF 42 and 53 certifications for cyst reduction, turbidity reduction, particulate reduction-class 1 are key. Additional approvals for chlorine, taste and odor reduction can be advantageous to offer as well (where applicable).

- How many seal points are on the filtration system under consideration? Each seal point is a location for potential failure. The more seals, the greater the possibility for an unacceptable leak or bypass. My personal opinion is that if a certified filtration system is designed with too many O-rings, gaskets and seals, the system is designed to fail.

- Economics can be a barrier to providing quality drinking water supplies. What is it going to cost to purchase, operate and maintain a particular filtration system? There are small PWSs that dis-
cover too late that they have installed very expensive filtration systems which they cannot afford to maintain. Do the math first. Are expensive pre- and post-filters going to be part of the package? Can local operators maintain the systems themselves? What is the cost of the required maintenance? If approved filter vessels (pre- and post-) are mandatory, is the system stuck using approved bags or cartridges that are single-source, proprietary and expensive?

Until recently, suppliers of equipment to PWSs have had to make compromises when selecting a filtration system. In some ways, one must choose among the least of several evils.

As a conscientious supplier of equipment to small PWSs and as a licensed operator in the State of Colorado, the search for new technologies that can meet the needs of our customers (independently tested and certified, are relatively easy to operate and cost effective) has led our company to consider ultrafiltration (UF) membrane technology.

UF is not new, per se. This type of membrane has been used to treat drinking water in public water supplies for many years. But only recently have these membranes been packaged in small, economical, self-contained, automatic and independently certified configurations to meet the needs of smaller suppliers.

The UF systems that we have begun deploying are NSF/ANSI 42 and 53 certified and have been independently tested and certified by the Water Quality Association (WQA) and Biovir Laboratories to the US EPA’s Guide Standard and Protocol for Testing Microbiological Water Purifiers (OPP Task Force Report, 1987). The filtration units present themselves very well economically, environmentally and aesthetically, with each UF system supplying 11 gpm and the possibility of multiple installations for higher flows. Hollow fiber UF membranes have a 0.02 micron (nominal) pore size with minimal total head loss through the filter. They are also highly efficient (up to 97 percent), with only the water used for backflush sent to drain.

The systems utilize a time-based controller to automatically initiate a backwash procedure to clean the membranes and are programmable to the raw water quality. The entire backflush uses only 7.5 to 19.5 gallons of water, depending on the program.

Functioning only on incoming line pressure (> 35 psi), these systems require electrical supply only to initiate backwash. The UF can be installed after pressure
tanks, chlorinator systems, greensand, sand filters and sediment filters; softeners can be added before or after (and UV can be added after, if required). Maintenance is minimal (requiring a certified technician). This offers a lot of design flexibility.

Perhaps best of all, the manufacturer of these systems (which also manufactures drinking water treatment plants as big as 100 million gpd) developed a portable on-site tester that can confirm membrane integrity in minutes. This additional level of security—used upon installation and at any time thereafter—is a big plus for operators and regulators.

Returning for a moment to the previously mentioned bag filter system that we spent months seeking approvals for, we substituted the bag filter portion of our proposal with a single UF system and pre-filtration (25-50 micron) kit and acquired State of Colorado approval within a week. As a professional, there is a definite sense of accomplishment to realize that you have found the best technology at the best price for a client—while producing a high quality effluent.

Better water quality, better filtration, better technology, less operations and maintenance, less ongoing costs for less money, what a concept! Look for UF to revolutionize small public water system supply.

References and glossary
2. Public Water System: A system for the provision to the public of water for human consumption through pipes or other constructed conveyances, if such system has at least 15 service connections or regularly serves an average of at least 25 individuals daily at least 60 days out of the year. A public water system is either a “community water system” or a “non-community water system”.
3. Community Water System: A public water system that serves at least 15 service connections used by year-round residents or that regularly serves at least 25 year-round residents.
4. Non-transient, Non-Community Water System: A public water system that is not a community water system and that regularly serves at least 25 of the same persons over six months per year.
5. Transient, Non-Community Water System: A non-community water system that does not regularly serve at least 25 of the same persons over six months per year.

About the author
Jack E. Barker is President of AAA Operations Inc. of Dumont, Colo. He has over 24 years experience in water/wastewater operations, maintenance and management. The company focuses upon uninterrupted service, stable operating costs and continuous safety and regulatory compliance for water treatment systems customers, including special districts, municipalities, ski areas, ranches, mines, private industry, restaurants, truck stops, trailer parks, campgrounds, developments, landfills and others. He can be reached at (303) 567-9500 or via email jack@aaaoperations.com or by post at PO Box 134, 48 Mill Creek Road, Dumont, CO 80436. Visit www.aaaoperations.com.

About the company and product
AAA Operations Inc. specializes in contract operations, maintenance and management of small public water and wastewater systems and is certified by the State of Colorado to operate these systems. The firm also supplies specialty equipment to its clientele on an as-needed basis. The UF systems referenced in this article can be seen at www.homespring.com.