

# Pretreatment Optimizes Membrane Filtration

UF membranes play a key role in providing drinking water to residents of Cass County, MO.

**P**ublic Water Supply District #7 in rural Cass County has been reliably and cost-effectively producing quality water since it was commissioned on July 29, 1999. "At 11:56 in the morning, to be precise," emphasizes Leonard Whiting, the superintendent of the plant, who has recounted the plant's successes during more than a hundred tours that he has hosted for water treatment professionals from Missouri, Kansas, and all over the country.

Visitors come to learn how effective pretreatment optimizes the efficiency and longevity of membranes filtering surface water. "Some people doubt whether membrane systems can stand up to challenges of treating highly turbid surface water, such as the water we pump from the South Grand River," Whiting said. "But we have proven that with proper design and maintenance, membrane technology per-

forms extremely well, at a reasonable cost."

## Consistently High Quality Water

At the core of the one-mgd plant is an ultrafiltration (UF) membrane system developed by Koch Membrane Systems, Inc. ([www.kochmembrane.com](http://www.kochmembrane.com)). "We chose this membrane technology to achieve our goal of producing consistently high quality potable water that meets current regulatory requirements and anticipates future regulations," said Whiting.

The ROMICON® 8-in. by 72-in. PMPW™ hollow fiber ultrafiltration cartridges ensure that the plant exceeds the Safe Drinking Water Act guidelines for turbidity. Whiting explains that, "current regulations require us to meet the 0.3-NTU threshold for turbidity 95 percent of the time, but we think we owe it to our customers to exceed that

standard more than 99 percent of the time. We continually meet that objective due to the physical barrier of the membranes."

With a nominal molecular weight cut-off of 100,000 daltons, the membranes also remove 99.99 percent of *Giardia*, *Cryptosporidium*, bacte-



*Installation of six-ft long, eight-in. diameter UF pressure cartridges on the system rack at Cass County.*

ria, and viruses. In addition, Cass County #7 is meeting regulations pertaining to the formation of harmful trihalomethanes and haloacetic acids, which occur when small, dissolved, naturally occurring organic molecules react with chlorine.

## Aggressive Pretreatment

There is little question concerning the capability of membrane technology to produce high quality water. The challenge is from the high turbidity of surface water, which consists of algae and other organics that can foul membranes and reduce their efficiency.

Cass County #7 has met that challenge with pretreatment in two stages. River water is initially pumped into a



*Visible here are the clear domes of several of the 36 UF cartridges at Cass County. The domes help with visual monitoring of fiber integrity.*

pre-sedimentation basin large enough for 16 months of storage. The basin is aggressively treated for algae—a critical step in pretreatment, according to Whiting.

The second stage of pretreatment is an Actiflo® conventional-type water clarification system, supplied by Kruger Inc. ([www.krugerusa.com](http://www.krugerusa.com)). Actiflo uses ballasted sand in a flocculation and coagulation process. This process significantly lowers the turbidity of the feed water entering the membrane system.

“For the past two-and-a-half years we have used an enhanced coagulation process, which has been a real plus in lowering TOC,” said Whiting. “This process involves changing water parameters by lowering pH and injecting coagulant. We carry the 6.3 pH water straight through the membrane. Just prior to distribution, we stabilize it with sodium hydroxide to raise the pH, lower alkalinity, and precipitate out some of the hardness.”

### Cost-Effective Performance

“With our pretreatment process, the membranes operate efficiently with

minimal fouling,” said Whiting. “And the hollow fiber membranes last longer.”

Membrane replacement costs are a significant contributor to the lifecycle costs of a water treatment system. Whiting has calculated the cost of the membranes during their first six years of operation and reports, “We are able to provide a superlative product to our customers, for a reasonable price.”

Whiting is also proud of the low maintenance requirements. Except for refilling chemical containers, Whiting claims he could leave the system unattended for months at a time. “The system virtually runs itself, and that is a big testament to the confidence we have in the technology.”

As the first plant in the country to



*Shown here are two recirculation pumps for the UF cartridges, one of which is on standby to provide the redundancy required by state regulations.*

combine Actiflo pretreatment with the KMS ultrafiltration membranes, Public Water Supply District #7 is proud to serve as a model for municipal treatment of surface water and happy to offer its expertise based on years of successful operation. 