

# UF Safeguards City Water Supply

Largest UF plant in North America.

**W**ater is among the Earth's most precious natural resources. While the supply seems to be plentiful, water is scarce in many regions, and each day over a billion people around the globe do not have access to safe drinking water. Safety concerns and stringent regulatory standards are causing cities around the world to find ways to safeguard water from harmful contaminants.

In 1993, Milwaukee experienced an outbreak of *Cryptosporidium*, a water-borne protozoa that if ingested can cause fever, weight loss, dehydration, vomiting, and death. The 1993 outbreak claimed the lives of more than 100 Milwaukee residents. This outbreak prompted the Minneapolis Water Works (MWW) to examine current and future risks posed to the water supply, as well as the possible solutions that would help safeguard the city's water.

## Eliminate Pathogens and Particulate Matter

"When we began this project, we knew we needed a system that would remove pathogens from the water supply," said Shahin Rezania, Interim Director of the Water Treatment and Distribution Service in Minneapolis. "The removal of *Cryptosporidium* and *Giardia* from our potable water supply was very important. In addition, we were seeking a technology that would be able to help us comply with future regulations in the water supply industry."

In 2000, after thoroughly researching the available technologies, Minneapolis Water Works, with its engineering Peer Review Panel and Citizens Advisory Committee, selected membrane ultrafiltration and invited GE Water & Process Technologies ([www.gewater.com](http://www.gewater.com)) to participate in the bidding and piloting process. The project sought an organization to provide the equipment and technology necessary to safeguard the water supply that was filtered at its Columbia Heights plant in Minneapolis. The technology also had to operate in conjunction with an existing softening and pretreatment system, which has served the city for over 60 years.

"In the project development process, the city considered several technologies including MF and UF," said Madalyn Epple, GE's Municipal Sales Manager of the Midwest Region. "With input from the Citizens Advisory Panel and the Peer Review Panel, they concluded that virus removal and a barrier for particulate matter and pathogens, such as *Cryptosporidium*, were top priorities. UF provided this capability, and because they didn't need dissolved solid removal, this technology was ideal for use at Columbia Heights."

Upon completion of the bidding and piloting process, Minneapolis awarded GE the contract to provide the UF membrane filtration equipment for the plant.

## High Removal Credits

To complete the project at Columbia Heights, GE provided Minneapolis Water Works with a UF system consisting of four trains with a total of 40 UF Units, 36 of which are operating today. The UF solution is a pressure-driven technology that provides a physical barrier to pathogens and is commonly used to remove suspended solids, bacteria, microorganisms, and viruses in potable water production. The systems utilize hollow fiber UF membranes, which provide the ability for system integrity testing. The membrane systems have two modes of operation: a production mode where feed is forced through the fibers to make product, and a backwash mode in which some of the filtrate is forced back through the membranes to remove any solids.

"GE met our bidding and preliminary performance requirements," said Rezania. "During the piloting process, we found the need to develop solutions to accommodate seasonal changes in the



Membrane ultrafiltration was selected by the Minneapolis Water Works to remove pathogens like *Cryptosporidium* and *Giardia* from the potable water supply.

feed water quality. GE acted as part of our team, working with owner's employees and consulting engineers to address membrane fouling issues encountered over multiple years of pilot testing."

The UF solution offered has been certified by the State of Minnesota for removal rate credits of 99.99 percent of *Cryptosporidium* and *Giardia lamblia*, and 99.99 percent removal of waterborne viruses. Additionally, UF provides consistent, superior water quality regardless of feed quality variations; dead-end operation resulting in low energy consumption; proven membrane life; and small system footprints and compact arrangements.

"While we were implementing the UF system, we found we had to continue to pilot during the entire process," said Mark Feinberg, GE's Project Manager. "Because the water in the Mississippi River changes with each season, we had to plan for many different scenarios. We were able to adapt our systems to accommodate this challenge while keeping the water quality consistent."

## The Results

The Columbia Heights plant, which combines GE's UF technology with NORIT (Norit Americas Inc., [www.norit-americas.com](http://www.norit-americas.com)) membrane technology, has a complementary system that results in the extremely effective removal of hazardous waterborne microorganisms and contaminants.



*Minneapolis Water Works now operates an ultrafiltration system consisting of four trains with a total of 40 UF units, 36 of which are currently in service.*

Testing has shown consistent water integrity and compliance with Minneapolis Water Works requirements.

The Columbia Heights facility will be capable of providing up to 72 mgd of potable water, making it the largest potable UF plant in North America. The only UF plant in the world that is larger is another GE plant in Kuwait, which provides up to 100 mgd. The UF system has been commissioned and has been providing safe drinking water for the over half a million residents in the Minneapolis area.

"During this project, we have been able to develop a sound, long-term rela-

tionship with Minneapolis Water Works," said Epple. "We have been working well together for about five years, and are looking forward to continuing work with them on the Columbia Heights' sister plant in Fridley, Minnesota, which will be capable of providing up to 95 million gallons of potable water per day."

In addition to the Columbia Heights Filtration Plant in Minnesota, GE has been awarded a contract by Mankato, MN, to provide UF technology in upgrades to their water treatment plant. The Mankato plant, which will provide 12 mgd to city residents, is expected to be online in April 2007. 