

## City of Lake Forest Water Treatment Plant

### HIGHLIGHTS

First low-pressure membrane system approved by Illinois EPA.

Phased, prioritized schedule of plant improvements.

New low-pressure membranes with an initial capacity of 14 mgd.

The City of Lake Forest had concerns about the ability of the Lake Forest Water Treatment Plant to meet existing and future water quality standards at its design capacity. In addition to the limitation of the treatment plant capacity based on water quality concerns, physical limitations of the plant's capacity prevented the operation of the plant at its 18-mgd design capacity. Furthermore, aesthetic constraints limited expansion of the existing building. To assess these issues, the City hired Carollo to develop a feasibility study.

Lake Forest is located on the shore of Lake Michigan. The quality of the water varies around the lake; however, pilot studies and full-scale plants have demonstrated that low-pressure membrane treatment is a viable alternative for direct treatment of the water supply. Based on an extensive study of the raw water quality data, Carollo prepared preliminary design criteria and cost estimates for a 14-mgd membrane treatment facility. This desktop study included a comparison of the anticipated O&M costs for both a conventional system and a low-pressure membrane system. Based on the results of the feasibility study, the City decided to proceed with an evaluation and pre-selection of one membrane supplier.

The evaluation process combined a present worth analysis and short-term pilot testing of three membrane systems. As a result, the City hired Carollo to follow-up on the one-year testing required by the Illinois EPA and design a 14-mgd membrane filtration facility around the preselected membrane system. The plant's design accommodates an ultimate capacity of 18 mgd.



*Eight skids equipped with 24 18-inch Aquasource membrane modules help to meet plant production and redundancy requirements at the Lake Forest Water Treatment Plant.*



Carollo completed the design in six months. Construction of Phase 1, which included the membrane facilities, was completed in May 2004. The plant is now successfully producing ultrafiltered drinking water for the residents of Lake Forest.

Construction of Phase 2, which included emergency engine generators and a dehumidification system, was completed in November 2004.

Change orders—including owner-requested additions to the scope—averaged less than one percent of the \$19.9 million construction cost.