

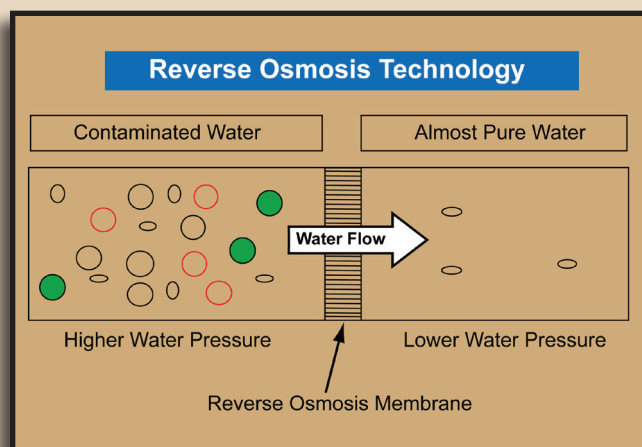
## New Generation Cellulose Acetate Desalination Membrane

New cellulose acetate membrane can reduce water treatment costs.

### What Is The Problem?

Cellulose acetate (CA) membranes, developed during the 1960s, were the first type of membrane used in commercial reverse osmosis (RO) water desalination plants. Relative to other types of RO membranes, CA membranes are less expensive, have a longer life, require less cleaning, and are much more resistant to chlorine.

However, due to impurities in the membrane that result from existing manufacturing processes, CA membranes allow more salt passage and require higher pressure than other types of membranes. High operating pressures consume more energy and adequate salt removal can require additional treatment; both of which increase operating costs. Because of these limitations, CA membranes are used in only 25% of RO water desalination plants.



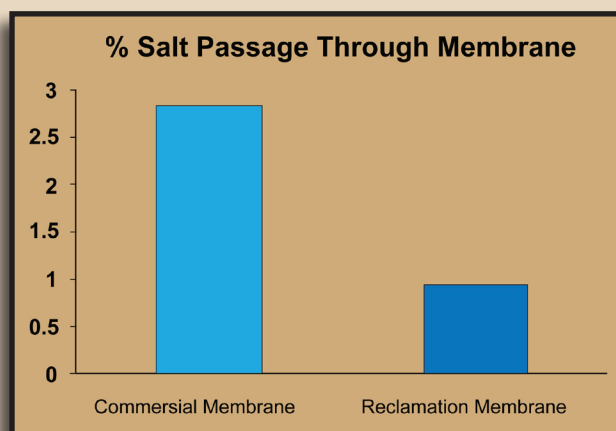
### What Is The Solution?

In collaboration with Separation Systems Technology Inc., Reclamation has developed new CA membranes that perform better than existing CA membranes by decreasing salt passage through the membrane. Reclamation's patent pending membrane manufacturing process (U.S. Patent Application No. 11/746,288) incorporates a solvent processing step that is more effective at removing CA polymer impurities than previous methods. Proof of concept membrane bench tests of new CA membranes was conducted at Systems Technology Inc. to display improvements in membrane performance characteristic.

The results of the tests supported the hypothesis by demonstrating lower salt passage and increased productivity. CA polymer processing was scaled up and 2.5 inch by 40 inch spiral wound membrane element were cast and rolled for pilot testing by a membrane manufacturer. Commercial membranes were also cast and rolled by the same manufacturer. The same formulation and starting material was used for both membrane types with the exception of the CA polymer, which was modified by Reclamation.

Pilot testing was completed at Reclamation's Water Quality Improvement Center (WQIC) and the results indicate a threefold decrease in salt passage through the Reclamation CA membrane as compared to commercial membrane while maintaining equal water production.

Long-term pilot tests will be conducted at WQIC in Yuma, AZ and/or at the Brackish Groundwater National Desalinization Research Facility (BGNDRF) in Alamogordo, NM.

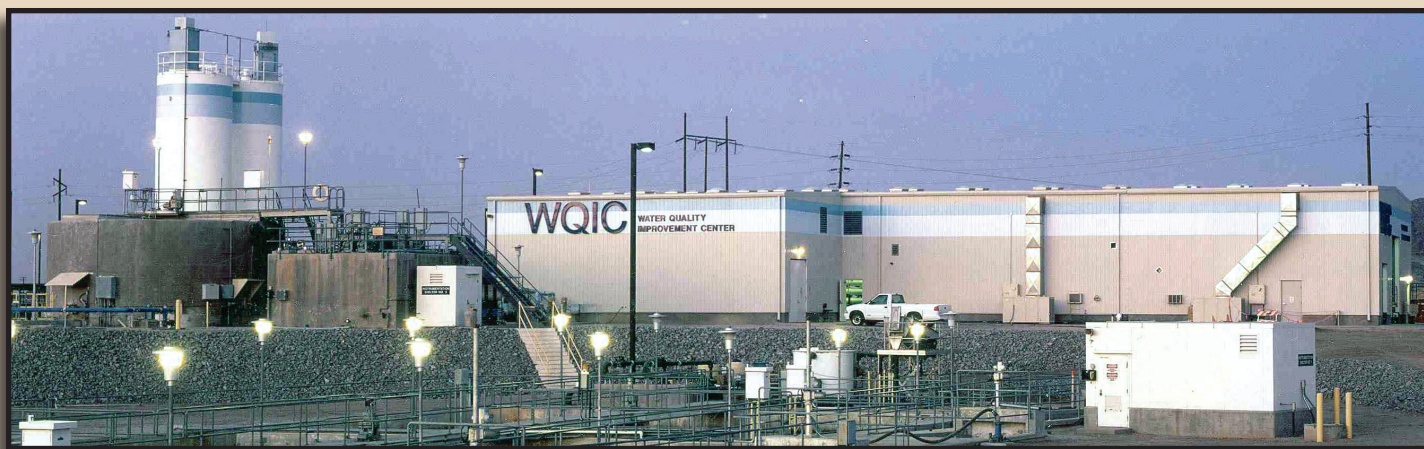


## Who Can Benefit?

Improved CA membranes will reduce the cost of RO treatment processes. Similar cost reductions will also be experienced where CA membranes are used in other RO processes, including food and beverages, pharmaceuticals, medical, chemical and gas separations. With the improved performance of CA membranes, new and existing RO facilities will treat increased quantities of water and other liquids while operating at lower energy requirement. Most importantly, RO water desalination plants will become more affordable offering a new alternative to many areas where drinking water is in short supply. All current users of RO treated water with CA membranes will benefit, as well as those in areas where RO will soon be utilized due to improved performance.

## Future Development Plans

The results of pilot tests are undergoing peer review for presentations at professional conferences and publication in journals. Reclamation believes there is still ample room to further improve this technology. Reclamation is currently seeking industry partners to mature and commercialize the new CA membrane elements.



Reclamation's Water Quality Improvement Center in Yuma, AZ

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## Collaborators

Reclamation's Science and Technology Program, Reclamation's Yuma and Albuquerque Area Offices, and Separation Systems Technology Inc.