American Membrane Technology Association

MEMBRANE TECHNOLOGY FACTS

IS DESALTED WATER RELIABLE?

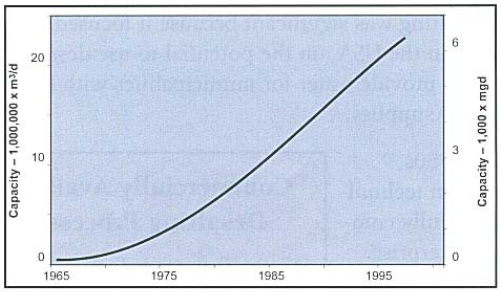
Most freshwater supplies throughout the world have been developed using traditional means such as wells for groundwater, diversions, dams, river/lake inlets, and reservoirs for surface water. However, not all locations have abundant fresh water to develop. In areas of the world where traditional water development opportunities are limited or not available, but where brackish (moderately salty) or seawater supplies are available, the application of desalting, or desalination, technologies has allowed cities and industries to grow and flourish. Although desalting has been used for centuries on a small scale, over the past 30 years it has been developed and refined to the point where desalting is now a widely accepted and reliable means of producing fresh water.

History of Desalting Development

Humans have produced fresh water from seawater for many centuries. Egyptian, Hebrew, Persian and Greek civilizations all studied desalting processes. In the 4th century BC both Aristotle and Hippocrates promoted the use of the distillation process to produce fresh water from the sea.

The freshwater needs of oceangoing ships that spent prolonged periods of time away from land prompted many advances in desalting technology. During the 1700's both the United States and British navies were producing fresh water from simple stills, using heat from the ship's cook stoves or engines to distill the water.

By the turn of this century, various types of land-based distillers were in use in several arid parts of the world. Advances in desalting technology during the 1960's reduced costs significantly, making desalting more practical as a water treatment process, and commercial units of up to 5 million gallons per day (mgd) were installed in many areas of the world. Worldwide desalting capacity grew from about 60 mgd in the 1960's to about 6 billion gallons per day today.



Total installed capacity of desalting facilities

Worldwide and U.S. Capacities

In 2001, desalting plants in approximately 130 countries worldwide have the capacity to produce over 6.0 billion gallons of high quality water each day. In many areas of the Caribbean, North Africa and the Middle East, desalted seawater is used as the main source of municipal supply. Saudi Arabia ranks first in total capacity with about 24 percent of the world's capacity.

Currently, more than 1,200 desalting plants operate in the United States, producing a combined capacity of over 300 million gallons per day. The US ranks second in the world in overall capacity. Most US plants desalt brackish groundwater or produce highly purified water for industrial use. Desalting processes are also used in home water treatment systems, to clean up industrial wastewater, to improve the quality of drinking water from sources high in dissolved minerals and other contaminants, for municipal wastewater treatment, and to improve taste, odor and color. The first major, permanent US seawater plant (25 mgd), is currently in the final planning and permitting stages in Tampa, Florida.

A number of different desalting technologies including various distillation processes, and membrane processes such as electrodialysis (ED), electrodialysis reversal (EDR), reverse osmosis (RO), and nanofiltration (NF) are used to separate dissolved salts and other contaminants from water.

Case History – Water Factory 21

In southern California, the Orange County Water District's Water Factory 21 has maintained a

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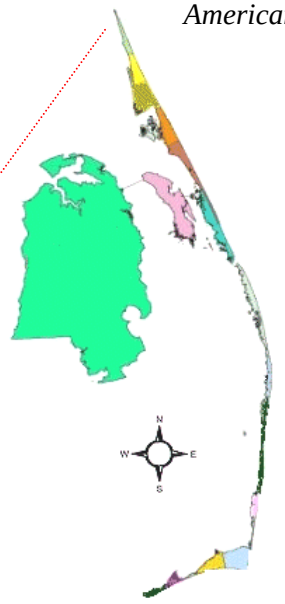
spotless record since it began treating municipal wastewater in 1976. Closely scrutinized by both state and regional water quality guardians, the 5.0 mgd treatment plant has met and surpassed stringent US Environmental Protection Agency primary and secondary drinking water criteria. The desalted product water is blended with 10 mgd of pumped groundwater. The blended water is injected into the groundwater basin below the area. The injected water serves as a hydraulic barrier that prevents seawater from intruding into fresh water well-fields near the coast, and adds to the water held in underground storage. In 1991, Water Factory 21 was granted permission by regulatory agencies to use 100 percent recycled water for injection, a clear acknowledgment of the desalted water's purity, and the reliability of the plant's operation. A 75 mgd plant is now being designed, combining membrane filtration and desalting technologies.

Case History – Dare County, North Carolina.
Dare County lies at the eastern edge of North Carolina, with the majority of the land surface being on the Outer Banks.

It is a historic region. Dare County is the site of the first English settlement in North America, the "Lost Colony". The Wright brothers made Kitty Hawk famous, when they made the first powered flight on the sand dunes. It has become a popular summer resort area, and since 1989 has depended on highly reliable membrane desalting technology for its public water supply needs. The County water department currently operates 3 RO plants; Kill Devil Hills, North Hatteras Island, and the most recent in South Hatteras Island close to the famous lighthouse.



Benefits of Desalted Water

Desalted water is not bound by many of the conditions that plague traditional surface water development. The increase in the public awareness of the environmental problems associated with surface water development coupled with the new, more stringent drinking water quality regulations make development of new traditional water resources more difficult and costly. Unlike traditional supplies, desalted water is not vulnerable to weather. Desalting technologies allow plants to be built in stages to meet demand, unlike traditional water development with its high initial capital outlay. Finally, desalted water is in many cases comparable in cost to water from traditional water supplies.

This material has been prepared as an educational tool by the American Membrane Technology Association (AMTA). It is designed for dissemination to the public to further the understanding of the contribution that membrane water treatment technologies can make to improving the quality of water supplies in the US and throughout the world.

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