By Harold Nicoll,
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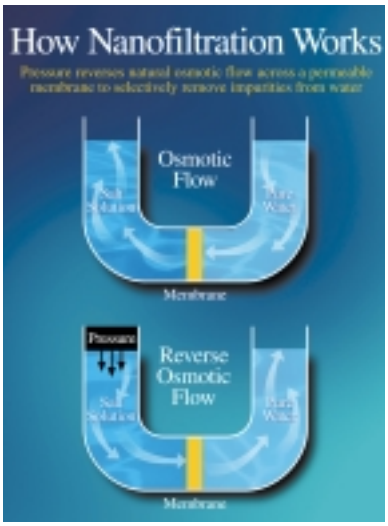
Nanofiltration Membranes

Water Needs, Unique Research Arrangement Lead to Membrane Development

More than 9,000 FILMTEC nanofiltration membranes remove impurities such as herbicides and pesticides from the river Oise for drinking. More than 500,000 people will receive their water from this plant, located just outside Paris, France.



Nanofiltration is a liquid separation membrane technology positioned between reverse osmosis (RO) and ultrafiltration. While RO can remove the smallest of solute molecules, in the range of 0.0001 micron in diameter and smaller, nanofiltration (NF) removes molecules in the 0.001 micron range.

NF refers to a membrane process that rejects solutes approximately 1 nanometer (10 angstroms) in size with molecular weights above 200. Because they feature pore sizes larger than RO membranes, NF membranes remove organic compounds and selected salts at lower pressures than RO systems.

NF essentially is a lower-pressure version of RO where the purity of product water is not as critical as with pharmaceutical grade water, or the level of dissolved solids to be removed is less than what typically is encountered in brackish water or seawater.

Nanofiltration is used where the high salt rejection of RO is not necessary. Like RO, NF also is capable of removing bacteria and viruses as well as organic-related color without generating undesirable chlorinated hydrocarbons and trihalomethanes (THMs). Nanofiltration is used to remove pesticides and other organic contaminants from surface and ground waters to help insure the safety of public drinking water supplies.

Sometimes referred to as "membrane softening," NF is an attractive alternative to lime softening or zeolite softening technologies. And since NF operates on lower pressure than RO, energy costs are lower than for a comparable RO treatment system.

As such, nanofiltration is suited especially to treatment of well water or water from surface supplies such as rivers or lakes.

Executing its responsibility as assigned by the Regisseur of Syndicat des Eaux de I'lle de France (SEDIF), Vivendi/Generale des Eaux chose nanofiltration as the best technology for the project on the banks of the River Oise.

A unique research arrangement between OTV and The Dow Chemical Co. led to the development of a nanofiltration membrane custom tailored to convert water from the River Oise into potable water for citizens living just outside Paris. This nanofiltration membrane will remove herbicides and pesticides from the water but leave in place dissolved minerals needed in human nutrition.

In 1991, SEDIF began a research program to study technological alternatives for purifying river water for human consumption. As sub-surface sources of water are depleted and municipalities ban their use because of land subsidence, townships and cities are using more surface-based sources of water such as lakes and rivers or even the ocean.

Water in direct contact with the surface is much more difficult to purify. Run-off from livestock, agricultural fields and industry means that rivers similar to the Oise contain more bacteria, herbicides, pesticides and other contaminants.

SEDIF knew that traditional treatment methods used on relatively clean well water would not work on surface water from the Oise. So, they immediately focused on alternative technologies such as NF as a better way to purify river water for drinking.

SEDIF and Vivendi began experiments in 1992, with a prototype unit using Filmtec NF elements and delivering water to 5,000 people in the nearby communities. The experiments were so promising that an agreement among all the companies involved was signed in early 1992 for further development. On June 6, 1994, the deputy minister of health, after notification by the Superior Council of Public Hygiene of France, approved the NF process for converting water from the Oise for consumption by the public.

In October 1994, Dow and OTV made an agreement for commercial development of the membrane prototype and later, on March 27, 1995, the French minister of social affaires of health and rural life approved the Filmtec NF200 membrane from Dow for use.

Today, 9,120 of these specially designed and built membranes are supplying water to approximately 500,000 people, just north of Paris—the results of a successful relationship.

About the Author
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