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Who Really Needs a Whole House Reverse Osmosis System?

By: Michael Dewar

Since Osmonics in Minneapolis Minnesota and Water Factory Systems in San Diego patented reverse osmosis technology in the late 1960's and early 1970's, millions of Americans at a minimum have an under sink ultrapure water system and a growing number have at least considered whole house reverse osmosis.

Reverse Osmosis basically forces the water through a membrane resulting in two waters: "**permeate**" the consumption water, and "**concentrate**" the wastewater. The permeate water is low in total dissolved solids, is extremely corrosive, low in pH and meets the scientific definition of ultrapure water. Water that permeates the membrane while free of metals such as sodium, chloride, calcium, iron and manganese, when configured properly results in a 98 percent reduction in the solid levels. The permeate membrane discharges the treated water in a low pressure environment holding tank and water levels in the tank are controlled by either a level or float switch. A secondary repressure pump (not part of the RO) delivers the water to the plumbing lines of the home. Both the RO treatment pump and the repressure pump demand high voltage and high amperage giving reverse osmosis the highest Kilowatt usage in whole house water treatment.

The high electrical usage is further increased by the need for a full pretreatment system needing to be installed ahead of an RO membrane, often involving a water softener, iron filter, carbon filter or in most cases all of them. The environmental issues and the need to own a full treatment system as a pretreatment leads responsible professionals to soft sell RO's. RO membranes are costly to replace and are easily damaged or scaled up if the pretreatment system is absent or fouled. Anyone who has owned a water softener knows this is not an occasional occurrence.

Reverse osmosis systems have come under intense environmental scrutiny in the US by both environmental organizations and state regulators focused on three issues:

1. The high energy use of reverse osmosis systems.
2. The high water waste factor, 25-75%.
3. The chloride and salinity discharge associated with both the RO concentrate and salt-based pretreatment.

Another Twin Cities MN manufacturer ECOsmarte claims a non-salt pretreatment system for both whole house and commercial RO applications and has been installing them as a package since 1995.

"Since the mid 1990's we have eliminated both the water softener and the iron filter in reverse osmosis applications. We have done so with a longer membrane life, fewer scaling issues at the membrane and a less corrosive final water," said Larry Couture, Chief Technology Officer at ECOsmarte.

Basically ECOsmarte converts the calcium to bicarbonate or soluble form and eliminates the need for salt softening. No sodium for calcium ion exchange occurs, and ECOsmarte filters the iron and manganese regardless of the source water pH.

continued on the next page

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Couture continued by stating in most cases the ECosmarte system eliminates the need for reverse osmosis completely. Stating that the ONLY time he recommends whole house reverse osmosis is if sodium or chloride levels exceed 1700ppm. These waters are rare, usually coastal or brine intruded from the ocean or oil and natural gas exploration.

When asked about under sink reverse osmosis systems Couture explained the primary application has been to remove sodium from a water softener and on rare occasions, usually involving treated lake water, ECOsmarte will recommend under sink reverse osmosis even with their proprietary zero salt whole house systems.

For source water with high chloride levels and in need of a whole house reverse osmosis system it is important to:

1. Purchase only a 95% or better RO system.
2. Purchase only 75% efficient equipment with three useable gallons of permeate water for each wasted gallon in concentrate.
3. Use a no salt pretreatment system.
4. Inspect everything monthly, replace membranes annually.
5. Own a second, back up membrane set or alternatively a second full redundant system.

“For those on the margins of horrible source water I actually recommend they try our pretreatment system only for a month or two, living with the water. We can always add the RO later,” Couture emphasized.

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