



By: Ben Movahed, PE, BCEE

If you have a tip or a suggestion for a future design article, please contact Ben Movahed.
(240) 780-7676
movahed@watek.com

How Often Do I Need To Clean My RO System?

Over time, reverse osmosis (RO) system operation gradually results in a buildup of foulants and scale on the membrane. While the industry has adopted a recommendation of quarterly cleans, the actual rate and degree of fouling depends on the feedwater quality and the system recovery. If these factors are not monitored and controlled properly, the cleaning frequency may be much higher.

Examples of common foulants and scales in RO applications include:

- Biological: bacterial slime, algae, or fungi
- Calcium carbonate scale
- Sulfate, calcium, barium or strontium scale
- Metal oxides: iron, manganese, aluminum, etc.
- Silica scale
- Inorganic colloidal deposits

Membranes should be cleaned when the RO performance begins to show symptoms of mild fouling and scaling and well before a major degradation in membrane performance or permeate water quality occurs. Normalized system data offers the most accurate and proactive method of recognizing these declines. Typically, an RO system should be cleaned when any of the following occurs:

- Decrease in normalized permeate flow greater than 10% - 15%
- Decrease in normalized permeate quality greater than 10% - 15%
- Increase in normalized pressure (across any stage) greater than 10% - 15%

The goal of cleaning is to restore membrane performance back to baseline conditions, with an allowance for membrane degradation due to age. This goal may not be possible if the normalized performance declines more than 20% to 30%. Delays in cleaning can result in elements never again performing as well as they did when they were new. Even RO system operators who enjoy relatively high-quality feedwaters elect to clean their systems at least once a year to protect long-term membrane performance.

The industry is serviced by specialty chemical suppliers who can help operators with site-specific cleaning procedures, chemical selection, and ideal cleaning solution temperature and pH. Many will review the normalized data and may also advise that water samples from some or all of the RO system feed and concentrate stages be collected to help identify possible site-specific foulants.

Timely and effective membrane cleaning helps operators achieve consistent and predictable RO system operation and maximizes the productive life of the elements. ■