

eNPure... Your Single Source Solution for: All Your Boiler and Process Feedwater Resources and Treatment Programs



## Increase Recovery Rates of Your Existing Reverse Osmosis System while Reducing Energy and Chemical Costs with Direct Osmosis - High Salinity Cleaning

DO-HS is a solution in applications with variable surface waters and high fouling ground waters

### BIOLOGICAL FOULING AND INORGANIC SCALING OF CONVENTIONAL REVERSE OSMOSIS SYSTEMS GREATLY DIMINISH IT'S BENEFITS

#### *Problems Caused by Fouling and Scaling:*

- *Decreased Recovery Rates*
- *Increased feed pressure and pressure drop*
- Frequent membrane cleanings and harsh chemicals
- Reverse Osmosis downtime with less water production
- High energy consumption
- Need for biocides
- Reduced membrane life
- Increased permeate conductivity

Recovery rates of Conventional Reverse Osmosis systems gradually decrease over time due to irreversible fouling and scaling. Direct Osmosis-High Salinity cleaning system enables your conventional RO to operate at its' design capabilities, cleaning the membranes without the need to shut down the high pressure pump. Fewer cleanings and replacements means greater uptime and reduced operating costs. DO-HS is a solution in applications with variable surface waters and high fouling ground waters.

### BENEFITS

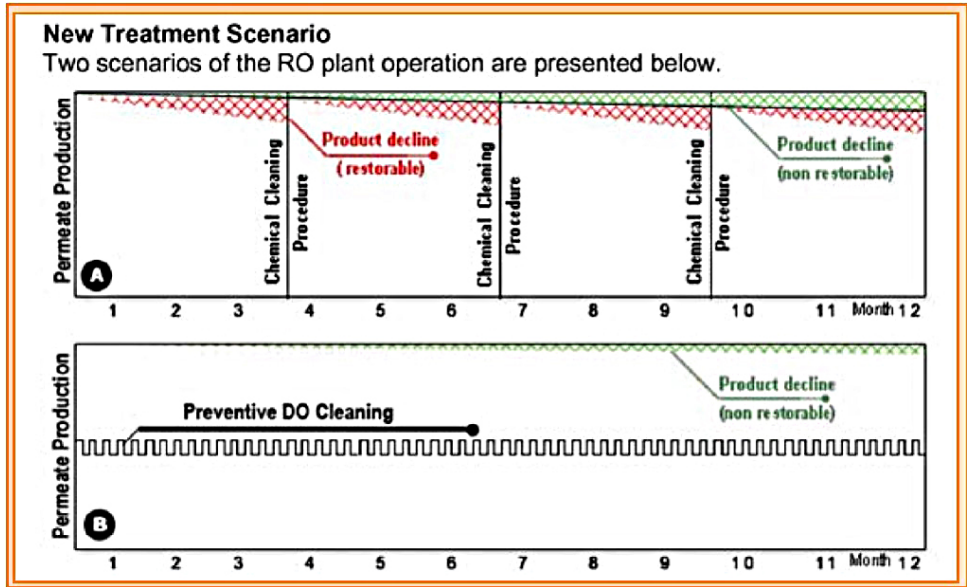
- ELIMINATE FOULING AND REDUCE SCALING FOR GREATER UPTIME AND PRODUCTION
- PREMATE RECOVERIES UP TO 85% RESULTING IN GREATER FEEDWATER UTILIZATION AND LOWER WASTEWATER DISCHARGE
- REDUCE ENERGY AND CHEMICAL CONSUMPTION COMPARED TO CONVENTIONAL RO SYSTEMS
- QUICK PAYBACK, GENERALLY BETWEEN 12 AND 36 MONTHS

Call eNPure for an evaluation today. 281-900-3842



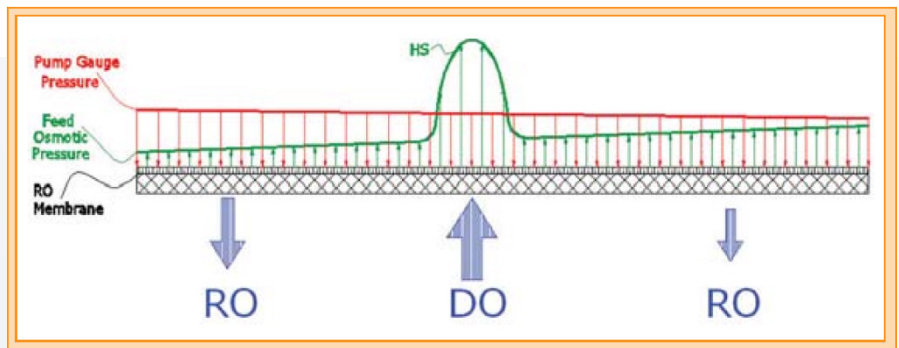
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*eNPure's water treatment experts can retrofit and install DO-HS Systems to a conventional RO utilizing advanced and proprietary process design and engineering*



**How the technology works:**

In normal RO operations, feed water pump hydrostatic pressure is higher than feed water osmotic pressure, forcing permeate out through the membrane. Feed water bacteria, clay, silt, and other particles are deposited and held on the membrane by RO flow causing increased feed pressure, higher pressure drops, and more chemical cleanings. With Direct Osmosis-High Salinity cleaning, fouling is backwashed from the membranes surface within a few seconds every day without stopping the feed pump.



In the clean-in- place tank, a 25% saline solution is added with an osmotic pressure of 2800 psi. For 10 - 15 seconds, this saline solution is injected into the feed water stream. The osmotic pressure is much higher than the hydrostatic pressure of the feed water pump, reversing the osmotic flow and back washing each membrane in succession like a vacuum cleaner.

As the saline slug moves through the pressure vessel, the process changes from reverse osmosis (RO) to direct osmosis (DO) in the area of the slug, then reverts back to RO once it has passed. During DO, the permeate moves back through the membrane and into the saline water slug; local permeate up-flow provides intensive membrane backwash. The fouling is lifted from the membrane surface and is swiped out into the drain with reject water.

The fouling layer is affected by two cleaning forces simultaneously - up-flow from direct osmosis and cross flow shearing velocity. The slug not only draws water from the membrane, it also dewateres the micro-organisms exposed to the saline water. The micro-organisms affected include bacteria, algae, and fungi. Lastly, the saline slug has very high ionic strength and is able to dissolve microcrystals growing on the membranes, decreasing scaling.



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