



## Expert Process Support Extends Membrane Life And Reduces Membrane-Related Expenditures By 65%

### Company Profile

A leading culinary solutions provider has a production facility located in the Western US. As with many industrial facilities, they use boilers for energy production. Reverse osmosis is used as a pretreatment to achieve high-quality makeup water to feed the boilers. Benefits of high-quality makeup water include reduced chemical consumption, lower fuel usage, and increased cycles of concentration by removal of scale-forming compounds.

### Challenge

Well water feeds the RO system, which had been experiencing increases in differential pressure, suggesting the membranes were scaling and/or fouling. Scaling typically happens in the tail end of a system, while fouling typically occurs at the front end. The operational data did not clearly identify the cause. Pretreat Plus® Y2K, a robust broad-spectrum antiscalant, has historically been injected ahead of the cartridge filters and, when dosed properly, should have mitigated any scaling potential. Typically, successful membrane cleaning can help narrow down what is collecting on the membrane surface, leading to prevention. However, specialty membrane cleaners were used without much success because of the severity of the fouling, thus requiring membrane replacement yearly.

Internal efforts made to modify RO system operation led to nominal success. After all avenues were exhausted to remedy the recurring issues, King Lee Technologies was contacted for their expertise to help determine the cause of the operational difficulties and to recommend a course of action.

### OVERVIEW

#### CHALLENGE

- ▶ Rapid fouling, leading to more frequent cleanings
- ▶ Fouling so extensive, membranes changed out annually
- ▶ Increased chemical and membrane-associated costs
- ▶ Needed a collaborative partner to find a resolution

#### SOLUTION

- ▶ KLT membrane autopsy identified key foulants
- ▶ On-site visit with an applications expert led to well disinfection recommendations and source of fouling was addressed

#### RESULTS

- ▶ Per King Lee's recommendation, well disinfection led to a minimum average savings of greater than 65% per year on membrane-related expenditures
- ▶ Additional savings achieved from decreased energy usage to run the high-pressure pumps and labor hours from repetitive cleanings

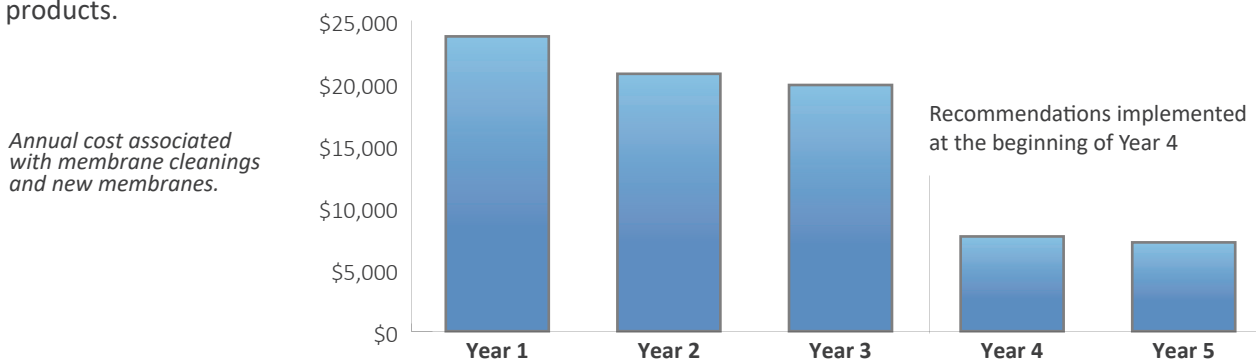
## Solution

A King Lee application specialist worked in conjunction with the technical team to troubleshoot. Collaborative efforts to share images, system information and data took place during the troubleshooting process. A scale projection of the feed water verified the proper antiscalant dosage, confirming that scale was not likely the culprit. Remote consultations led to a recommended autopsy with foulant analysis and a Biological Activity Reaction Test (BART). The element to be autopsied was first wet tested and normalized to manufacturer test conditions. It had a normalized permeate flowrate of 34%, a normalized salt rejection of 97.1%, and weighed 1.6 pounds more than a brand new element. Typically, severe scaling tends to increase membrane weight more significantly than organic fouling. The membrane study confirmed that a combination of iron-related and slime-forming bacteria was the almost exclusive cause of the system decline.

A King Lee application specialist visited the site for a support consultation. Investigation confirmed the root cause was from the presence of bacteria in the source well. Recommendations were made, including well disinfection, which helped extend membrane life and reduced overall membrane-related expenditures.

## Results

The implemented recommendations resulted in longer run times between membrane cleanings and an extension of membrane life. A minimum reported annual cost savings of greater than 65% has been achieved through a decrease in membrane-related expenditures, which includes the introduction of professional off-site cleaning services by King Lee Technologies. Additional cost savings include decreased energy consumption, membrane cleaning labor, and maintenance. King Lee Technologies' expertise in RO process support and strong technical background has enabled this facility to help overcome their water treatment challenges so they can focus on what they do best, creating delicious and innovative food products.



Day 5 BART showing a positive result for iron-related (left) and slime-forming (right) bacteria.



Pre-autopsied membrane element showing severe fouling.