



**OCACS Environmental Program**

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**Influence of Precoagulation on Nanoparticulate Fouling of  
Microfiltration Membranes**

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**Abstract:** The objective of this project was to elucidate the fouling mechanism of 0.2  $\mu\text{m}$  pore size hollow fiber polypropylene microfiltration (MF) membranes. Laboratory studies indicated there are two potential mechanisms of MF fouling 1) pore blocking via surface cake formation by particulates greater  $>0.2 \mu\text{m}$  and 2) pore plugging due to intercalation of nanoparticles  $<0.2 \mu\text{m}$  into the membrane matrix. The size of nanoparticles responsible for MF fouling was determined to be  $>3.5\text{nm}$ , suggesting a pore plugging mechanism. To reduce nanoparticulate pore plugging a coagulant (Sumaclear 700) was used to aggregate the nanoparticles into microparticles  $>0.2\mu\text{m}$ . Coagulant concentrations of 2.5ppm, 5ppm and 10ppm were pilot tested for their ability to improve membrane performance, and increased times between cleaning intervals from 35, 48 and 68 days, respectively. Examination by scanning electron microscopy revealed deep penetration of nanoparticles into the membrane matrix supporting the pore nanoparticulate plugging hypothesis. Results from this study demonstrate that preventing nanoparticles from entering the membrane matrix could improve hollow fiber polypropylene membrane performance, increase cleaning intervals and decrease O & M costs.

**Speaker Bio:** Ms. Safarik is the Senior Scientist in the Research and Development Department at the Orange County Water District. In her 20 years with the District she has worked on many projects relating to membrane fouling and membrane performance. Her most recent work has been to study the mechanism of microfiltration fouling by reclaimed waste water and the development of potential mitigation strategies. She obtained her Bachelors of Science from California State University of Long Beach and MBA from Pepperdine University.

**Reservations:** Limited to first 25 with reservations. E-mail reservations to Ganesh Rajagopalan [[RGanesh@KennedyJenks.com](mailto:RGanesh@KennedyJenks.com)] by 7-20-10.

**Driving directions:** From Interstate 405, exit on Jamboree Road and go NORTH. Turn LEFT on Main St up 2 lights, then RIGHT on Cartwright Rd. and LEFT into the first driveway.