



Avista Technologies offers an array of technical and support services which can be effective tools in understanding and improving the performance of reverse osmosis membranes. These include:

Laboratory Services:

* **Water Analysis:** With half a gallon (2 liters) of RO feedwater, this test provides the cation and anion data necessary to obtain an accurate and site specific antiscalant recommendation.

* **Foulant Identification:** This analysis requires a membrane leaf which is examined to determine the nature of any foulants present and their effect on the membrane. Potential foulants can include scale, biological matter, metals, etc.

* **Coagulant Recommendation and Dose:** Requires a minimum of five gallons (20 liters) of the feedwater to the multimedia or sand filter. From this, the optimum RoQuest coagulant and dosage is determined. This provides the most efficient and cost effective coagulation within the filter.

* **Flocculant Recommendation and Dose:** A minimum five gallon (20 liter) sample of the feedwater to the clarifier/flocculator is sent to Avista and used by our personnel to complete a jar test procedure. The results determine the type and specific dose of the most effective RoQuest coagulant/flocculant for that application.

Membrane Autopsy:

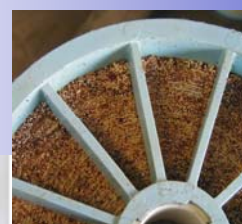
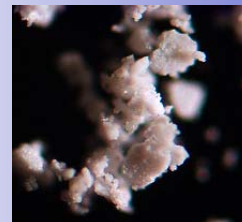
The physical dissection of an RO membrane and the laboratory analysis of its foulants can be one of the most definitive methods of troubleshooting an RO system. An Avista autopsy includes a wide range of procedures, as shown below, and concludes with our summary and recommendations:

External and internal visual examination

- Wet test of the element
- Chemical identification of surface foulants using
 - FTIR spectrometer
 - Energy Dispersive X-Ray Spectrometer (EDX)
 - Scanning Electron Microscope (SEM)
- Loss on Ignition test
- Cell and Dye test
- Fujiwara Test

Off-Site Membrane Cleaning:

Avista Technologies cleans both 4" and 8" diameter RO membranes in our facility. Each membrane is pre and post tested to confirm the cleaning results. They are then packaged in new boxes and bags and returned to the customer. This service is valuable for those customers who do not have cleaning equipment on site, do not have adequate equipment, are subject to severe discharge restrictions.



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