

### 8-4. Element Analysis

If high salt passage is found only in one or several elements in one or several pressure vessels, then it is most likely that the element(s) could have mechanical damages such as punctures on the membrane surface, glue line failure, a cracked centerfold of the membrane and damaged O-rings including brine seals. Damaged O-rings and brine seals can be verified easily by visual inspection of the failed elements.

Damaged membranes and glue line failure can be visualized only by the autopsy of the elements. Alternatively, those physical damages can be verified by a dye test along with the test for salt rejection and flux using a small test line containing methylene blue or rhodamine B. If the dye is detected visually or spectroscopically in the permeate, this proves there is a considerable damage in the membrane or glue line. Then the element can be autopsied to find the causes of the damages.

When there is a general system failure, a front end element or a tail end element should be taken out of the vessels for examination, depending on where the problem is located.

When the problem cannot be located, an element from both ends of the system should be taken. Typical front end problems are due to fouling and typical tail-end problems are coming from scaling. Vessels/elements with these problems usually show low permeate flow rate and sometimes a high salt passage from severe fouling and scaling.

If the membranes are damaged by chemicals such as chlorine and concentrated acid, a high salt passage along with a higher than normal permeate flow rate would occur usually in all the elements of the first array. If the accidental high dosage of the chemicals into the system is not corrected immediately, the membranes of the second array would also be damaged.