

Project Number

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Evaluations of High Recovery and ZLD Technologies and Applicability for Water Utilities

Principal Investigators:

Michael C. Mickley, P.E., Ph.D.

Cash Contributors (in addition to the Bureau of Reclamation):

State Water Resources Control Board (CA)

Awwa Research Foundation

Water Environment Research Foundation

City of Phoenix

Objectives

Evaluate the performance and costs of commercially available high recovery (HR) and zero liquid discharge (ZLD) processing schemes over a range of size, salinity, and water composition variables.

Identify regulatory issues associated with HR and ZLD processing

Since there are no HR (including ZLD) municipal desalination plants in the U.S., project research began with identification of commercial HR processing schemes used in other industries. Five general processing schemes were found to account for most of the 120+ ZLD sites in the U.S. Detailed performance and costs of these five processing schemes were developed over a range of size, salinity, and water composition variables. Performance and costs of selective salt recovery processing (a commercial process outside of the U.S.) and of three commercial high performance technologies were also developed.

Regulatory issues associated with the HR production of brine or mixed solids (the final wastes for disposal) were analyzed.

Highlights

- Performance and cost of HR (including ZLD) systems are highly dependent on salinity and composition of feedwater.
- The high costs of HR processing are associated with capital cost and with energy, chemical, and final waste disposal costs
- While major capital cost reduction may depend on the development of alternative desalination technologies there are promising means for reducing energy, chemical, and solids disposal costs.
- Consideration of HR processing is suitable only when conventional concentrate disposal options are not obviously available and cost-effective.