Each year the Central Arizona Project (CAP) and the Salt River Project “import” over 1,000,000 tons of salt along with the water supplied from the Colorado and Salt-Verde River systems. Arizonans use up the critical water resource but the salt remains and builds up salinity in the area’s aquifers and reclaimed water resources. Yet salt-affected waters are needed to achieve a sustainable water supply for drinking and other uses. The only viable solution to removing the salt is desalination, but the cost of both treatment and residuals management is high. AWI invited experts to develop a roadmap for applied research on these problems leading to sustainable use of saline water resources.

**PROJECT TEAM**

**Organizing Committee**
- Wendell Ela (UA) – Lead and Primary Contact
- Chuck Graf (AWI)
- Tom Poulson (U.S. Bureau of Reclamation)
- Jim Baygents (UA)
- Jan Theron (NAU)
- Peter Fox (ASU)
- Chris Scott (UA)
- Paul Gremillion (NAU)

**Workshop Sponsors**
- Arizona Water Institute
- U.S. Bureau of Reclamation (BOR)

**Supporting Sponsors:**
- Brown and Caldwell
- Errol L. Montgomery & Associates
- Damon S. Williams & Associates

**PROJECT FUNDING CYCLE**
- 2007

**WORKSHOP GOAL**

The goal of the workshop on August 6, 2007 was to identify research priorities in the desalination of source waters in Arizona and the arid West, defined for this workshop as waters ranging from CAP water containing total dissolved solids of about 700 mg/L to brackish waters containing up to 10,000 mg/L of TDS. The workshop focused on research opportunities most likely to:

- Improve energy and hydraulic efficiencies of desalination systems,
- Increase recovery of usable water and reduce volume of residual concentrate, and
- Promote more effective, environmentally benign management of the concentrate.

**BACKGROUND**

High quality water resources are not sufficient to sustain current nor projected municipal, industrial, and agricultural demands in Arizona. Wastewater reclamation and brackish water utilization and treatment will play an increasing role in meeting Arizona’s water needs. This trend, together with the salt accumulation problem, makes it clear that an overall salt management strategy almost certainly will consist of a combination of reverse osmosis (RO) treatment and benign concentrate disposal. In such systems, water recovery (the percentage of clean water produced) and brine minimization (to the point of Zero Liquid Discharge if practical) are exceptionally important.
WORKSHOP FORMAT

Desalination experts gave presentations on the status of research and current practices in treatment technologies, concentrate minimization technologies, and concentrate disposal approaches. Subsequent breakout sessions were specifically structured to encourage discussion on the following topics:

- Source control measures,
- Pre-treatment of feed water to reduce RO membrane scaling and increase water recovery,
- Membrane technology, focusing on measures to improve performance,
- Post-RO treatment of the concentrate stream to increase recovered water and reduce concentrate volume, and
- Management and disposal of the remaining concentrate and residuals.

WORKSHOP OUTCOMES

The full report on workshop outcomes is available at www.azwaterinstitute.org. The report distills the wide-ranging discussions of the breakout sessions and provides a roadmap for the considerable research and evaluation work still needed to move from conceptual to implementation stage on a large scale. The roadmap describes a need for a regionally focused desalination R&D center, recommends short-term desalination research that will provide relatively rapid benefits, and lists long-term research needs that potentially will provide large, yet longer horizon, payback on investment.

CONCLUSIONS and RECOMMENDATIONS

The near unanimous conclusion reached by the participants was that “there is no silver bullet.” There is not currently, nor is there likely to be in the future, a single technological solution to achieving high water recovery from inland desalination. Similarly there is no single identifiable means of handling and disposing of the large volumes of concentrate that desalination will generate. Experts expect that high efficiency desalination will require a hybrid treatment train consisting of pre- and post-membrane treatment measures, tailored to the specific chemistry of the source water. This treatment train will operate in an environment in which physical, regulatory, and economic measures are in place to address source control and final residuals disposal. The final report and research roadmap arising from this workshop describe research that is needed to achieve a holistic approach to inland desalination and salt management.

For additional information about desalination research, see Wendell Ela’s 2007 project, AWI-07-42, Water Recovery and Residuals Management for RO Treatment of CAP Water. The fact sheet and final report for AWI-07-42 are available on the AWI website.

FIND OUT MORE

Find out more information at www.azwaterinstitute.org