RECLAMATION

Managing Water in the West

Bureau of Reclamation Concentrate Management

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Texas Desal – September 11, 2014

U.S. Department of the Interior
Bureau of Reclamation

Agenda

- Introduction
- Background
- Overview of Research Programs
- Final Published Reports
- Current on-going work
- Future work
- Conclusion

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Advanced Water Treatment Program

- **Vision**
  - **Reclamation is a leader in facilitating the development and application of advanced water treatment (AWT) to**
    - **increase water supply from non-traditional sources**
    - **reduce costs of AWT**
      - **attractive option relative to other supplies**
    - **understand and minimize the environmental impacts of AWT relative to other supplies**
    - **maintain and develop the capacity to be a leader in AWT**

- Increase water supply
- Reduce cost
- Reduce environmental impacts
- Identify institutional barriers

Advanced Water Treatment Program

Internal Program

- Science & Technology Program
- Funds Reclamation researchers
  - Partner with external entities
- ~ $1million/year

External Program

- Desalination & Water Purification Research Program (DWPR)
- Funds private sector, individuals, academia, state/local entities
  - Partner with Reclamation
- ~ $1 – $2 million/year

Funded Research since 1996

TITLE	PRINCIPAL INVESTIGATOR	DATE
Eastern Municipal Water District RO Treatment/Saline Vegetated Wetlands Pilot Study	Bureau of Reclamation and Eastern Municipal Water District	1996
Brackish Groundwater Treatment and Concentrate Disposal for the Homestead Colonia El Paso, Texas	University of Texas at El Paso	1999
Halophyte Crops and a Sand-Bed Solar Concentrator to Reduce and Recycle Industrial, Desalination and Agricultural Brines	University of Arizona	1998
Evaluation of Two Concentrate Disposal Alternatives for the Phoenix Metropolitan Area: Evaporation Ponds and Discharge to the Gulf of California	Bureau of Reclamation and Arizona Municipal Water Users Association	2000

Funded Research since 1996

TITLE	PRINCIPAL INVESTIGATOR	DATE
Membrane Concentrate Disposal: Practices and Regulations Concentrate database	Mickley & Associates	2001
Thermal Desalination Using MEMS & Salinity-Gradient Solar Pond Technology	University of Texas at El Paso	2002
Evaluation of Precipitate Fouling for Colorado River Water Desalination using RO	Metropolitan Water District of Southern California	2002
Zero Waste Brine Management for Desalination Plant	University of Texas at El Paso	2002
Systems Development for Environmental Impact Assessment of Concentrate Disposal	Oregon Health and Science University	2003

Funded Research since 1996

TITLE	PRINCIPAL INVESTIGATOR	DATE
Volume Reduction of High-Silica RO Concentrate Using Membranes and Lime Treatment	University of Texas at El Paso	2004
Zero-Discharge Seawater Desalination: Integrating the Production of Fresh Water, Salt, Magnesium, and Bromine	University of South Carolina	2006
Using Oil Fields for the Disposal of Concentrate from Desalination Plants: Please Pass the Salt	Texas Water Development Board	2005
Reverse Osmosis Recovery Maximization	Carollo Engineers	2008
Membrane Concentrate Disposal: Practices and Regulation	Mickley & Associates	2006

Funded Research since 1996

TITLE	PRINCIPAL INVESTIGATOR	DATE
Cost-Effective Volume Reduction of Silica-Saturated RO Concentrate	University of Texas at El Paso	2008
Systems Development for Environmental Impact Assessment of Concentrate Disposal - Development of Density Current Simulation Models, Rule Base, and Graphic User Interface	Portland State University	2007
Evaluation and Selection of Available Processes for a Zero-Liquid Discharge System for the Perris, California, Ground Water Basin	Eastern Municipal Water District	2008
Treatment of Concentrate	Mickley & Associates	2009

Funded Research since 2011 (pending final reports)

TITLE	PRINCIPAL INVESTIGATOR	DATE
High-Volume Water Recovery from Silica-Saturated RO Concentrate using a Batch-Treatment Seawater RO System	University of Texas at El Paso	2011
Combining Electrodialysis Reversal and Slurry Precipitation and Recycle Reverse Osmosis Technologies to Increase Recovery at Inland Desalters	Carollo Engineers	2012
Demonstration of Zero Discharge Desalination at the Brackish Groundwater National Desalination Research Facility at Alamogordo, New Mexico:	University of Texas at El Paso, Veolia Water Solutions, and City of Alamogordo, NM	2012

On-going and New Funded Research

TITLE	PRINCIPAL INVESTIGATOR	DATE
Evaluation of a Small Rural Community Zero Liquid Discharge Desalination System	Trussell Technologies, Inc	2014
Reverse Osmosis Concentrate Management through Halophyte Farming	University of Arizona	2014
Pilot Scale Groundwater Desalter Brine Concentrator Study	Eastern Municipal Water District	2015
Concentrate Management Toolbox and Selected Case Studies	Bureau of Reclamation, Eastern Municipal Water District and North Texas Metropolitan Water District	2015
Oxnard Saline Demonstration Wetland	Bureau of Reclamation and City of Oxnard	2015

Remarks

- **Bureau of Reclamation continues to look at funding research, pilot, and demonstration projects in the area of concentrate management**
  - **Reduce cost of desalination**
  - **New technologies**
  - **Focusing on coastal and inland areas**
  - **Concentrate from all water types (seawater, groundwater, surface water, wastewater)**

AWT Research Coordinator

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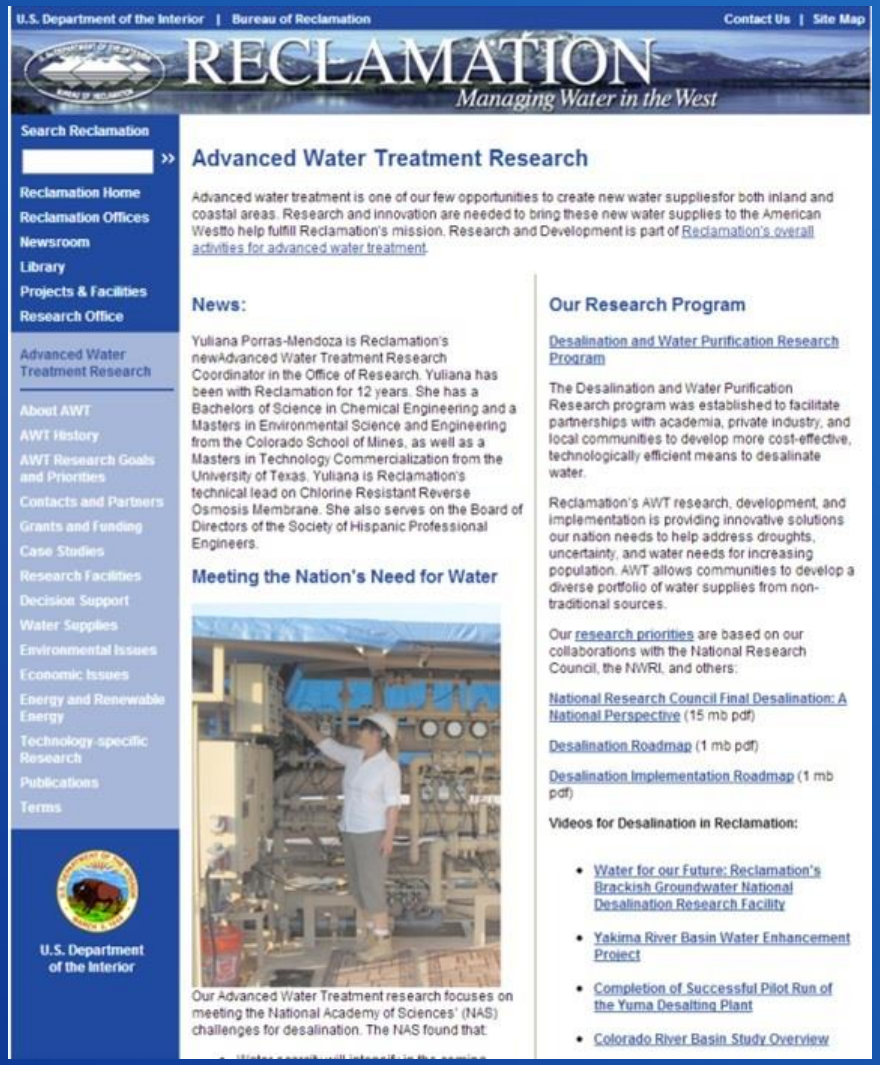

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